The Builder.

VOL. LXXXIII.—No. 3113. OCTOBER 4, 1902.

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A Note on City Architecture.

AS has been mentioned in our columns from time to time, the authorities in Paris have instituted two or three years back a system of offering prizes for the new street fronts which were regarded as architecturally most satisfactory in the judgment of a jury of assessors appointed to award the premiums, which carry with them also certain advantages to the building-owner who, though not the designer, has encouraged and given opportunity for the design premiated. We published for the first time, in our issue of August 23, an illustration of one the fronts which had received the official imprimation. We give among our illustrations in the present issue the fronts of two street houses in Paris, built some three or four years ago, which did not receive prizes, and were in fact built, we believe, before his new ordinance came into existence, but which represent pretty adequately the hitherto prevailing type of Paris street architecture dating from the period of the Second Empire and the reign of Haussmann. A comparison of the two is rather curious, as an indication of what seems to be taken as the path of improvement in Parisian street architecture.

There is no doubt that the old picturesque Paris, as we knew it from old engravings and from some of the old streets in Montmartre and elsewhere, was destroyed under the two Empires; the great Napoleon commencing and pointing out the way for the alterations carried out on a much larger scale under the Second Empire. The Haussmann régime took the French Renaissance as a starting point, and remodelled the principal streets into a prevalent and consistent style which showed indeed little variety, and little of the more refined quality of Renaissance architecture, but had neverth[illegible]s the element of style, and a prevailing civ[illegible]gnity which, it did not rise above a certain [illegible]vel, at all events did not sink below it. The city acquired thus that palatial aspect in its streets which led an English novelist to remark that while Paris was a *city*, London was only a collection of villages. A great capital should show dignity in its street architecture; and this at least Paris acquired in the erection of the style of street front of which the two houses illustrated in this issue are fairly typical specimens. Many persons, in England at all events, find this style of street architecture lacking in interest; its details seem to come out of the same pattern-book, so to speak; the combinations vary a little, but the elements are much the same—carved decorations in rococo classic, and decorative iron balconies; the difference between the work of one architect seems, for the most part, hardly perceptible. And yet with all these drawbacks, the stone-built streets of Paris have unquestionably the quality of style; they form a city architecture which, if conventional, is always dignified.

It is perhaps partly owing to the feeling that this type of street architecture is monotonous—that it has done all that it can do and leads to nothing further, that the Parisians, always alive to the possibility of improving their city in the artistic sense, have started the idea of premiums for the best-designed street fronts. The idea is an excellent one in itself; it is a practical recognition of the architectural importance of street architecture; but there is certainly a danger connected with it, and it may be doubted whether those who first promoted the idea quite realised where it might lead them. It almost necessarily encourages the development of the personal element in the design, to the detriment of the total effect. At any rate, this tendency is emphatically indicated in the premiated front which we illustrated on August 23. There is certainly life enough in this in a sense—or at all events vivacity (which is not quite the same thing); some of the details are very original and piquant, if not very beautiful. But the notable and unfortunate point about it is that the element of style, which was pre-eminent in the conventional type of Paris front, is here absolutely sacrificed. The design is without style—almost ostentatiously so; it has none of that dominating unity of character which renders the nineteenth century Paris street balanced, dignified, and satisfactory to the eye. The competition for the premium seems in this instance at least to have had the effect of inducing a desire to do something as different as possible from the ordinary Paris front. If this difference ran all in one direction the ultimate effect might be to produce another unanimity of street style, only of a different type from that now prevalent. But the probability is that the system will not work in that way. It will be more likely, especially after this award, to operate towards making each competitor for the coveted honour endeavour to be "original and as unlike any other competitor as possible. And with that, if the system is carried far enough, will go the distinguishing quality of the existing Paris street architecture viz., its dignity and uniformity of style, so suitable to the streets of a great capital.

This is not without a lesson to ourselves. The tendency of some of our architects who carry out street fronts is already in the direction which the Paris premiums seem to have encouraged; that of a certain eccentricity in design and an entire disregard to the character of a street as a whole. It is all very well to say that this is picturesque; it may be, but it is the destruction of dignity; and it is the quality of dignity and of a certain unity of style which is really wanted in the streets of a great capital. This equality Paris has, and seems in danger of losing through the misapplication of a well-meant effort. This we, in our far cheaper and humbler way, once aimed at in such efforts as Regent-street and its quadrant and circuses. Regent-street is a poor architecture in detail, but it was worth something as a whole, and that something is now getting entirely destroyed through total indifference to the design as a whole. It was our one attempt at palatial dignity in a city street; a feeble one, carried out when architecture was in a very feeble condition; but still a well-meant attempt, and one that should have been respected. And if we ever offer premiums for the best street fronts, the reward should go not to the best *per se*, but to the best in subordination to the whole street effect. The neglect of that condition is the mistake the Parisians seem to be making in their new move to improve street architecture. We require reform rather in the opposite direction.

HARTLAND CHURCH, NORTH DEVON.

HARTLAND, so well known to West-country tourists for its grand and wild seaboard, is, next to Lidford, the largest parish in Devonshire, extending over an area of 16,700 acres. In the old days, when the Austin canons occupied the abbey of Hartland and held the appropriation of the church, this great parish with its multitude of isolated hamlets was well served. There was not only a formally ordained vicarage at the great church of Stoke, close to the abbey, and about a mile and a half to the west of the town of Hartland, but there were fifteen chapels in as many hamlets where divine service was celebrated. When, however, at the dissolution of the monasteries the great tithes fell into lay hands, all this spiritual provision came to an end, nothing but a very poorly endowed vicarage remained, and one by one the chapels all disappeared. In 1839 the old town hall of the former mayor and corporation, in Hartland proper, was rebuilt as a chapel of ease; but, save for this, the whole of the vast parish, with hamlets five, six, and seven miles distant, is dependent for its church services on the fine church of Stoke St. Nectan, more usually spoken of and rightly considered as the parish church of Hartland.

From the width of the district for which it serves, but more especially from the size and dignity of the fabric as contrasted with those of most of the neighbouring parishes, Hartland Church is often known by natives as well as visitors by the proud title of "the cathedral of North Devon." The ground plan consists of chancel with aisles and north vestry, nave with north and south aisles, north and south transepts, north and south porches, and western tower. The tower, including the pinnacles, is 144 ft. high. The length of the church is about 140 ft., and its breadth, exclusive of transepts or porches, 45 ft.

There are not a few interesting details to be gleaned of the history of this fine and remarkably situated church, and its connexion with the adjacent abbey, many of which have not as yet been published. Our only intention, however, in this sketch is to offer some description of the fabric and its furnishings, more especially as the multitude of guide-books to this district, of all prices, are for the most part so strangely and fantastically wrong in their accounts of a church that is so well worthy of close study.

Without stopping to investigate its origin, there seems no reason to doubt the statement usually put forth that the first church on this commanding site was erected a few years before the Conquest by Gytha, wife of the great Earl Godwin, and that it was dedicated in honour of St. Nectan, in the belief that the influence of that saint had saved the life of the earl in a shipwreck on that deadly coast. St. Nectan, a local seventh-century saint, is also commemorated in the neighbouring church of Welcomb, about six miles distant on the Cornish border, a very small cruciform fabric having undoubted traces of pre-Norman building. Of the church built by the Lady Gytha nothing is left save a considerable number of well-shaped stones, many of them of a large size, which can be readily traced in parts of the walling, and which obviously pertained to an older fabric than that now standing.

The church underwent a severe restoration at a somewhat unhappy and rather pretentious period, viz., 1848-50, which puts considerable difficulties in the way of a right understanding of its features. At that date the east end of the chancel was entirely rebuilt. A walk round the exterior of the church would cause the uncritical observer, possessed of some knowledge of Gothic architecture, to feel confident that here, as with most churches of the district, fifteenth-century work predominated. The window tracery throughout is of the Perpendicular style, but closer observation shows that the whole of it, or nearly the whole of it, belongs to the Victorian restoration, and in some cases is clearly out of keeping with the mouldings of the window jambs. On entering the church it becomes obvious that the arcades between the nave and the aisles are of fourteenth-century date. The fact is that, with the exception of the tower and a Victorian vestry arrangement on the north of the chancel, the whole of the fabric shows that there was a complete rebuilding on an extensive plan in the last-named century.

The mouldings of the nave arcades and of other details are of that simple character which makes any attempt at precise dating difficult; but it seems most likely that the church was replanned and constructed anew at the time when Roger de Ralegh was abbot of the monastery in the adjacent valley. He began his rule in 1330, and died of the plague at the beginning of 1350. It is highly probable that the terrible visitation of the Black Death, which raged with particular severity in Devonshire (1349-50), cut short the full plan of rebuilding, so that the church was left without a tower until the next century.

The tower is earlier than most of the Perpendicular towers of North Devon, and was probably erected in the first quarter of the fifteenth century. It is a remarkably good example of substantial building of that date. Evidently the greatest pains were taken to build securely in so exposed a situation. This is especially noticeable in the battlements and pinnacles, which appear to have been from the first well secured with lead-set cramps. The tower is of four stages, with buttresses set on the square at the angles. On the east face of the second stage, just clear of the apex of the nave roof, is a large niche with a crocketed canopy, containing a figure of St. Nectan; the workmanship of the niche is better than that of the image. This is a rather unusual position for the image of a patron saint; possibly it was placed here because of the exposed sea aspect of the west side, and because the church was usually approached from the east, by those coming either from the town of Hartland or from the abbey.

In the church, at the west end, on the south side of the fine lofty arch into the tower, is an interesting old font, which though some two centuries older than the present fabric is in good condition. It is of Late Norman date; the upper part is 2 ft. 2 in. square, and handsomely arcaded on each face; the base pillar has a cable moulding and a chevron pattern on the shaft.

But the special feature of the church is the singularly handsome and effective screen which stretches right across the nave and aisles in a line with the east wall of the small transepts. There is no chancel arch, a feature very rarely to be met with in churches of this district. When this beautiful screen was erected, probably in the third quarter of the fifteenth century, the arches of the arcades through which it passes were somewhat altered for its accommodation. The narrow stairway to the top of the screen is in the thickness of the wall of the south chancel chapel, and is still available. The screen is most rich in its details, and has a groined canopy on each side. The length is 47 ft. 8 in., and the width on the top is 5 ft. 10 in. The full height is 12 ft.; it is 8 ft. to the spring of the canopies, and 10 ft. to the centre of each compartment. There are five traceried openings each side of the central doorway. The patterns of the carvings of the different sections of the canopy work are exceedingly varied, no two being exactly alike. The cornice mouldings, which are of five orders, are exceedingly rich and minutely executed. The delicacy of the cresting on the west front (it has gone from the inner side) is often pointed out as showing the strength of the wood to resist the effects of time. To our mind it looked suspiciously and awkwardly perfect, and on mounting the screen the cresting turned out to be a gilded length of cast-iron work, an abomination of the 1850 restoration! The cornice is all gilded, but now much dulled in appearance, and there is a good deal of painting in other parts, mainly red and white, and including some upright mouldings done in barber-pole work of red and white and black and white. It would be quite worth while to have the whole repainted with care and taste. As it is, it is neither one thing nor the other, for the present amount of painting is poor and patchy in effect and dingy in appearance. Certain wiseacres might think it rather shocking to do away with the traces of the "original" painting and gilding, as it has often been termed. But there is no great antiquity in this colouring of the Hartland screen. The gilding now apparent has obviously been poor stuff when first applied, and we may be sure that no such contrast in colours or such weak tones as now prevail would have been employed in the days of its first erection. The parish is fortunate in possessing a book of church accounts extending from 1597 to 1706. These accounts show that the screen was twice painted in the seventeenth century, at a cost of about ten shillings each time. They also give the information that "a pair of organs" was set up on the rood loft in 1637-8, and that during the Commonwealth the rood loft was seated throughout. An organ was again placed there in 1845, but removed at the restoration a few years later. All trace of the loft or panelling on the top of the rood screen has long since disappeared; but the great timbers still bear the holes where the supports were fixed, and the larger openings on the top of the centre of the western beam show the exact positions of the rood, flanked by the Mary and John.

Parts of the roofs of this church are well worthy of attention. The original fourteenth-century cradle or waggon roof, with boarded panels, still exists over three bays of the nave, namely, from the rood screen as far west as the line of the porches. The panels, with large stars in the centre, and the ribs of the roof, are painted; the colouring dating, we suppose, from the Victorian restoration. It is difficult to believe that the present colours, though not ineffective at a

distance, are in any sense reproductions of the original design. The north chancel aisle has been very richly treated both in colour and carving. The panels are painted in ultramarine blue, studded with raised gold stars. Each panel is divided by diagonal moulded ribs meeting in a gold boss in the centre; the ribs are beautifully coloured in blue and red and green; each rib is also outlined with gilded fleur-de-lis crestings. It is piteous to see the condition of this exceptionally fine and delicate example of enriched fourteenth-century roofing. Could not something be done to restore the loose pieces to their places, and to preserve the rest? During a recent visit we picked up two delicate bits of carved and gilded cresting from the pavement below, and there are a number of pieces on the top of the organ. Up to the time of the Victorian restoration there was an equally beautiful roof over the south chancel chapel. The main feature of the colouring of that roof was, however, red or vermilion. The Guild of Our Lady made use of the north chancel chapel, where the roof was coloured blue.

The nave is chiefly fitted with substantial oak seats or benches of late sixteenth-century date. In the south chapel are several bench ends bearing the initials H.P., which stand for Hugh Prust. He was an important landowner in Hartland, and the last upholder of the Guild of Our Lady before the Reformation. The seats bearing his initials have been transferred from the chapel on the other side of the chancel. There is a pretentiously carved but ineffective modern pulpit in the nave; this replaced a really fine Jacobean pulpit at the time of the Restoration. Five well-carved panels of this pulpit can still be seen behind the organ, bearing the words, "God save King James Fines." What the word on the last panel means is a puzzle. The suggestion that it is a mistake for *finis*, implying that it was the last panel, seems ludicrously insufficient. It is possibly some forgotten family name, perhaps that of the donor of the pulpit. Ines is a surname not unknown in the West; the carved letters are all capitals; would they have meant F[rederick] Ines?

The monuments are not very remarkable. In the chancel is a slate slab, with an incised cross on a calvary base, and a black-letter marginal inscription. Locally this is known and pointed out as "the bishop's tomb," but there is no episcopal symbol of any kind. The inscription is almost illegible, but we made out the date to be 1465. A beautifully worked table-tomb, panelled, and ornamented with three small uncharged shields, does duty as an altar at the east end of the chancel. The date seems to be about 1400. It is said to have come from the abbey. This is quite possible, but the assertion—universally made in guide-books—that it is an original stone altar, and one of the only ones in all England, is a complete mistake. Another fictitious bit of interest always printed about this church, and apparently believed by every one, is that there is "a sanctuary knocker" on the chancel side of the old door into the north vestry. It is sometimes kindly explained that, of course, the door has been turned round, for a knocker must have been on the outside! The knocker in question is an ordinary and somewhat small example of a scutcheon plate with ring attached, which was for a long time the invariable accompaniment of every heavy mediæval door—whether church or manor house—and was simply intended for convenience in closing the door. There are several better examples of such ring handles on other church doors in the district, and the church rambler, here and elsewhere, meets with a tendency on the part of incumbents and others to style them "sanctuary rings" or "sanctuary knockers." We were assured, for instance, at Hartland that no one would be touched or arrested even for murder, so long as he had his hand on that knocker. This idea of a sanctuary knocker, which is still so specially insisted on at Hartland, probably had its rise from the large ornamental ring knocker at Durham, which may really have served this purpose. For at Durham, as at Beverley, and at Beaulieu in the south, there were special sanctuary privileges extending over a considerable area, and lasting for an indefinite period, when the sanctuary seeker was duly registered. In addition to this, every church and churchyard in the kingdom, from the days of Alfred to those of Henry VIII., was a sanctuary for a certain defined period, and required no knocker of any kind whatsoever.

Over the north porch is a parvise or room, from which there is a small opening into the church. It was probably occupied by some guardian of the church, and is still known as "the guard chamber." Since we visited it many years ago, it has taken into its keeping the old parish stocks, which are exceptional in possessing an odd number of ankle-holes. The much-respected vicar, Rev. T. H. Chope, who has been in charge at Hartland since 1859, remembers seeing them in use at the beginning of his incumbency, when they stood just outside the main churchyard gates. Over the entrance of the south porch is a mural sundial, of the year 1804, with the appropriate but rarely seen motto, "Life passeth like a shadow."

Under the tower there now stands the great base stone of a fourteenth-century churchyard cross, which was dug up in the churchyard when a well-designed new cross was erected close to the east gates in 1897. This stone has been roughly hollowed out in a circular shape to receive the base of the cross shaft, and has been, strangely enough, declared to be an "old Saxon font." It has been placed in the church with the idea, so we are assured, of being placed on a base opposite the Norman font. As it is neither a font nor Saxon, this would be an unfortunate mistake. If the parish authorities will consult any competent antiquary or architect, they will be saved from such a blunder. In the churchyard, close to the beautiful new cross, a discarded altar stone of slate should be noted. The consecration crosses are irregular in number and position. Can this have been owing to some crack or flaw in the slate, and the impossibility of substituting another one when the bishop arrived?

NOTES

Royal Academy Lectures.

We have received the prospectus of the Lectures to Students at the Royal Academy for the Session 1902-3, which is a rather vague document. The subjects of the lectures on chemistry, by Professor Church, and on anatomy, by Professor Arthur Thomson, are given; but of those on painting (Professor Prinsep) and sculpture (Professor Gilbert), it is merely stated that "the subjects will be announced in due course;" and the same statement is made in regard to architecture, without even the name of the lecturer. This looks as if things went on in a very *laissez faire* kind of manner at the Royal Academy, and that the Professors of Chemistry and Anatomy are the only two who are really giving their minds to the business of lecturing to the students. It may be replied that chemistry and anatomy are practical subjects which really admit of demonstration, and that pure art does not; and indeed the artistic lectures have sometimes been of a rather perfunctory kind, and evidently so regarded by the student portion of the audience. The chemistry lectures are announced to commence on October 6; those on anatomy on October 27; and those on painting, sculpture and architecture respectively on January 12, January 26, and February 16 of next year.

Motor-cars and the Roads.

The recent holidays have brought into prominence the question of the speed of motor-cars. The country villages have been invaded by motorists who often consider twenty miles an hour a reasonable speed to pass along even a winding hill through a village, whilst on the level roads they are encountered at speeds of some forty to fifty miles an hour, and the County Benches have at every sitting to inflict a series of fines. On such occasions the motorists urge that no speed limit should be imposed upon them by law, but they support this contention with the fallacious argument that a speed limit discourages a growing industry, overlooking the fact that the best way of encouraging an industry is hardly to make the instruments it produces a terror and nuisance to other people, and motorists must remember that not 1 in 3,000 of their fellow ratepayers use the roads as an express train line. Reasonable beings, however, can hardly resist the conviction that motor cars in increasing numbers have to be reckoned with in the future, but at the same time the ratepayers are entitled to every protection from an ever increasing danger. In cases of fatal accident, now so numerous, it is to be hoped juries will have the courage of their opinions, and in cases of conviction the severest sentences should be passed by tribunals dealing with cases of manslaughter. The question of road maintenance, under these new circumstances, is much exercising the local authorities. In Kent the expense amounts to 155*l.* per mile, whilst in some other counties the cost is as low as 80*l.* It is true the motor car probably wears the road far less than other vehicles; but the amount of wear, and the attendant inconvenience to others, should count for much; and seeing the distances they cover, they monopolise roads which they pay nothing to maintain.

The American Engineer in England.

In a paper recently read before the Western Society of Engineers at Chicago, the opinions of an American engineer are expressed upon English methods of conducting building operations. The author came to this country with the contractor who undertook to complete the Westinghouse works in Manchester, and his experience appears to have been gathered chiefly in that city. Sufficient general comment

has already been made in our columns and elsewhere upon the contract in question, and we now propose to call attention very briefly to the points which appeared to the author to be worthy of mentioning to his fellow engineers in Chicago. In the first place he points out that the clerk of works and about a dozen assistants were scattered over the works in little offices, and did not exercise any effective control over the conduct of operations. The interruption to work by the breakfast hour was very great, the amount of work turned out by the men in general, and by bricklayers in particular, was much below the American standard, and mechanical appliances were of inadequate character. Immediately on arrival, the new contractor commenced to reorganise the whole conduct of affairs. The clerks were collected into a central office, and instructed to keep the same hours as the men; the breakfast hour trouble was got over by degrees; and bricklayers were so encouraged by liberal payment that at first double the usual number of bricks per man was laid daily, and later, four times the number. The result is said to have been partly due to the use of thinner mortar, and of the most approved labour-saving auxiliaries in the form of mortar mixers, concrete mixers, brick hoists, painting machines, &c. The opinion is expressed that the fault in this country is slack management, and the employer is blamed more than the man, for it is said that the results attained by the American contractor show what can be done with the British workman when he is properly managed. Structural ironworkers also come in for adverse criticism, especially their deep-rooted antipathy to labour-saving appliances, such as pneumatic tools. Remarks are also made upon the dilatory methods of firms supplying materials for use. It is always instructive to listen to genuine criticism, which in the present case seems to be amply justified by the fact that the American contractors actually accomplished in little more than one year a quantity of work which English builders said could not be completed in less than five years.

The Lauch Valley Dams: Alsace-Lorraine.

Four dams have now been completed by the German authorities in Alsace-Lorraine for the purpose of regulating the flow of the streams in the Vosges mountain district. The last dam, which has lately been finished, proved to be the most troublesome of the series to construct, and the methods followed are of some interest. The dam rests upon dense, glassy sandstone in a valley at a considerable elevation, and is a curved structure about 240 mètres long, by four mètres wide at the top, and nearly twenty mètres wide at the bottom. The lines of maximum and minimum pressure fall within the middle thrid of the dam, and at the overflow sections the masonry is increased in thickness by ·75 mètre. In consequence of observations made it was considered advisable that the downstream face of the dam should be shielded by an earthen bank for the purpose of minimising the action of the sun, and so of reducing movement due to temperature fluctuations. The reservoir formed by the structure has a capacity of about 197 million gallons, at a level of 1 mètre below the crest, and two waste weirs at each end have a combined capacity of 8,750 gallons per second. Local sandstone, known as "graywacke," was used for the mass of the structure, but some granite was necessary for the facing of culverts, as "graywacke" is not amenable to treatment by ordinary stone-working tools. The coping, parapet, and weir arches are of concrete, in the proportion of Portland cement 1 part, sand or broken stone 8 parts. Trass mortar was chosen in preference to cement mortar, because it could be safely used when a considerable period had elapsed after mixing. In fact, mortar of this kind could be revived after having been made for as long as two days without losing its value. The advantage of this quality will be realised when we mention the fact that operations were liable to frequent interruption by rainstorms. As the mortar was of purely hydraulic character, the water of the reservoir was kept close to the top of the work, with the result that the mortar hardened excellently. The dam contains about 28,000 cubic mètres of masonry, and was constructed by the Government, under the supervision of Mr. Fecht, as chief engineer.

Alternating Current Progress.

English electricians would do well to study more closely the progress that is being made on the Continent in the methods of supplying alternating currents for lighting and power purposes. After long hesitation they are adopting polyphase systems in the large power distributing stations now approaching completion, but in the meantime other systems are springing up. So far as we know, the polyphase machines in these stations are hand regulated, and there has been no attempt at compounding them to give constant voltage. In France both Leblanc and Boucherot have been very successful in building machines on what they call the *compoundage* principle, and there are hundreds of these machines in every-day use. Some eight or ten years ago we suggested a method of allowing alternating and direct currents to flow along the same mains, as by this means greater power can be transmitted by them. The idea was developed by Bedell, in America, and recently great progress has been made in its practical application by Professor Arnold, of Karlsruhe. Instead of using direct and alternating currents, he uses alternating currents of different frequencies, and although theoretically the basis is not so sound, yet a sufficient margin of profit is allowed over a one-frequency system to make its adoption certain in many cases. Any number of currents of different frequencies can be transmitted over one main so that the heating effect is merely that due to the sum of their individual heating effects as they do not practically interfere with one another. To be able to supply economically currents of two frequencies, one for lighting and the other for motors, would be a considerable advance on present systems as the frequency that is best for one of these purposes is quite unsuitable for the other. There are also other applications of polycyclic currents. For example, in the sugar factory at Cambrai, alternating currents of three different frequencies are employed when starting and stopping the electric motors coupled to the heavy sugar turbines, and by this means a considerable waste of energy is prevented.

Heating Workshops.

In this country very little attention is paid to the warming of workshops, the general idea apparently being that the men ought to generate sufficient natural heat by energetic working. Sometimes this is quite easy, but at others a little artificial warmth is really necessary. Men often arrive in the early morning cold and quite disinclined for active effort, and the result then is that until breakfast time has passed very little real work has been accomplished. Employers, who are wise, know that the cost of heating apparatus may be amply repaid by increased production, but such knowledge is by no means universal. Even when heating is attempted, the methods are of the most primitive nature, and ventilation is not infrequently neglected altogether. As an example of a thoroughly adequate heating system we may cite the apparatus installed in the new locomotive shops of the Buffalo, Rochester, and Pittsburg Railway Company. Exhaust steam from various engines is here utilised, and after passing through a feed-water heater, it is conveyed to the locomotive shops and roundhouse, where separate air-heaters are provided. The machine shops contain some 2,440,000 cubic feet of space, into which warmed air is delivered at the rate of 59,000 cubic feet per minute, at a pressure of ⅛ oz. per sq. in. Two duplicate fan units are provided for the distribution of the air, each blast-wheel being 10 ft. diameter, direct connected to 9½ in. by 10 in. horizontal engines working at 150 revolutions per minute. Each fan exhausts through an air-heater composed of eight sections of steam coils in series. From the fan air is blown directly upward through a 72-in. pipe to a point above the roof truss, where he pipe divides into two smaller branches having outlets from which air is delivered at a velocity of 1,200 ft. per second outward in all directions, and downward at an angle of 35 deg. The air is thus spread out and diffused through the shops, and it returns at low velocity along the floor from all parts towards the apparatus. Air supplied to the heaters comes directly from the building, and the greatest distance to which it is blown is 120 ft. No special arrangement is made for the admission of fresh air, the assumption being that sufficient ventilation is provided by the numerous doors and windows. The installation is capable of changing all air contained in the buildings once in twenty minutes, the air discharged from the pipes overhead is at 160 deg. Fahr., and by diffusion it maintains a temperature of 65 deg. Fahr. throughout the shops. The warming of the roundhouse is similarly effected, but the warm air is delivered to the pits through brick and tile pipe ducts laid underground in Portland cement.

Re-Heating Compressed Air.

Some recent tests conducted at Cornell University bear upon the gain to be expected from the re-heating of compressed air used in various mechanical appliances. The results arrived at may be thus briefly summarised:—The net gain in economy was 31·7 per cent. with air at 57 lbs. pressure, and 38·4 per cent. when the pressure was 82 lbs. Economy was found to be increased with rise of temperature, but the increase was gradually lessened after the temperature had reached 300 deg. Fahr. Although it is

possible that the advantages mentioned may be influenced by increase in volume of the air, it is probable that the high results are attributable to other changes of condition in the working of the engine. Thus re-heating is calculated to obviate difficulties due to the freezing of moisture in the exhaust passages, and the choking up of the valve. Three important points appear to be secured by the employment of a re-heater in the manner described: (1) absence of freezing in the engine, (2) reduced cost of plant generally, and (3) permanent increase of economy in working.

Old Wooden Water Pipes.

AN unwonted spectacle may just now be seen in New Bond-street in the shape of a large number of water-pipes which have been dug up in the course of laying down some iron tubes for telephone wires for the General Post Office by Messrs. J. Mowlem & Co., contractors. The pipes, for the most part of oak, elm, and beech wood, consist of trunks—a few of them yet retain their bark—varying up to some 7 ft. in length, and bored to a diameter of from 6 in. to 8 in.; the joints are made by the simple means of inserting the tapered ends into the sockets, the latter in a few instances being strengthened with an inlaid ring of metal. The pipes in New Bond-street, which of late years had belonged to the Grand Junction system, are, it would appear, relics of the old water service belonging to the City of London, which gave a name to the Conduit Mead estate still owned by the Corporation. Old Bond-street was built in 1686, Conduit and New Bond streets in 1718-20. The mead included the ground now covered by Bond-street, Hay Hill, Grafton-street, portions of Conduit and Albemarle streets, Mill-street, and other thoroughfares in the vicinity. The Tyburn, or Aye Brook, supplied many conduits in the City and in London, nine of them being in the western parts of the town. There were three conduit-heads in Mill Hill Field, where is now Stratford-place, Oxford-street. On the site of Aldborough House, at the end of Stratford-place, stood, until 1737, when the cisterns beneath the banqueting-house were arched over, the house in which the City Chamberlain used to entertain the Lord Mayor and Common Council when, on September 18, they made their annual visitation to the conduit-heads and disported themselves in hunting foxes and hares before and after dinner. The old conduit, formerly in South Molton-street, is in the Guildhall Museum. Within the Park railings, a short distance westwards from Hyde Park Corner, may still be seen the building for the tank that collected spring water for St. James's and, latterly, Buckingham Palaces, the supply being derived from the conduit-head at Bayswater (Lancaster-gate), which from a very remote period had supplied the Abbey at Westminster.

St. George-the-Martyr, Holborn, Burial Ground.

WE read that the site and enclosure of Cooke's School of Anatomy, one of the last after its kind in London, are soon to be incorporated with the surrounding burial-ground that belongs to the church of St. George-the-Martyr, Holborn, in Queen-square. The school was established about thirty years ago in a part of the burial ground. The graveyard, situated in St. Pancras parish, and adjoining the parochial burial-ground of St. George, Bloomsbury, on the north side of the Foundling Hospital, was originally laid out in pursuance of the Act 10 Anne, cap. 11, six years after the building of the church as a chapel of ease to St. Andrew, Holborn, and having been finally closed against interments in 1853 was opened as a public resort about fifteen years ago. For some while a strong prejudice prevailed against the use of the ground. In order, it is said, to conquer that unreasoning objection the first grave dug there was that of the author of "Fasts and Festivals of the Church," concerning whom the parish register of burials contains the entry—"1714, January 28, Robert Nelson, Esquire, of Gloucester-street. *Vir Insignis*." His conspicuous monument, bearing a Latin epitaph composed by Bishop Smalridge, was restored by the late William Butterfield in 1888 for subscribers to a fund collected in that behalf. Close by is the grave of Edward Dilly, the bookseller. A marble tomb, described in Noble's "Life of Cromwell," and to be identified by the coat-arms of Gibson and Cromwell, party per pale, carved in stone at either end, marks the resting place of Dr. Thomas Gibson, Physician-General to the Forces, and author of "The Anatomy," who died, *s.p.*, on December 27, 1727, in Bedford-row, and of his widow Anna, the sixth and favourite daughter of Richard Cromwell. The latter was born at Hursley Park, near Winchester—her mother's inheritance—on March 27, 1659, during her father's Protectorate. Amongst other notable burials we may mention those of Dr. Stukeley, the antiquarian, and during many years rector of the parish (1765); Jonathan Richardson, the painter (1771); Dr. John Campbell (1775), editor of "The Lives of the Admirals" and "The Biographia Britannica"; and Zachary Macaulay, father of Lord Macaulay, who occupied a house—since pulled down—in Great Ormond-street, whence he removed to Clarges-street, Piccadilly, where he died in May, 1838.

American Architects in Greece.

ACCORDING to a paragraph in the *New York Times*, a large church is to be built at Patras, in Greece, and it has been decided to open a competition for the design to American architects. The wording of the paragraph implies that the competition is confined to American architects, though this is not distinctly stated. It is desired that the church should be in the Byzantine style. Why American architects are especially desired we do not gather; but if any of the best American architects compete we have no doubt they will produce something worth having. The church will apparently be a large one, as it is to seat 5,000 persons and to cost 50,000*l*. Premiums of 400*l*., 160*l*., and 80*l*. are offered.

PUBLIC HALL, ALFORD, ABERDEEN.—A new public hall for the Alford district has just been completed. The architect was Mr. G. F. Milne, Aberdeen. The hall is built of Syllavethie granite, and the builder was Mr. Alex. Grant, Alford. The other contractors were:—Carpenter work, Mr. A. Fowlie, Alford; slater work, Messrs. Christie & Sons, Dyce; plumber work, Mr. William Leask, Alford; plaster work, Mr. Wm. Moir, Inverurie; painter and glazier work, Mr. T. Fyfe, Alford. The hall is 87 ft. in length, and 43 ft. in breadth, and consists of two halls, the larger of which is seated for 500 persons and the smaller for 100.

LETTER FROM PARIS.

M. DAUMET, the architect, is putting in hand the work of restoring the important buildings of the old Palais de Justice at Paris. These buildings are in a most neglected state, and the work will occupy some time.

M. Berlier, the well-known engineer, has now explained to the Chamber of Commerce of Havre the details of his scheme for the construction of the tunnel proposed to pass under the River Seine, at Tancarvel, near Rouen. The tunnel will take the form of a round tube, 17 ft. in diameter, placed on a foundation of concrete embedding the lower portion of the tube. For a distance of 800 yards under the bed of the river the tube will be formed of a series of segments of cast-iron solidly bolted together, and the exterior of this portion will be protected by a thick coating of hydraulic lime mortar, forced in by means of a special apparatus. The two end portions of the tunnel will be constructed of armoured concrete 10 in. thick. The cost of the two tunnels, each of a length of about 2,700 yards, is estimated at 800,000*l*. The Chamber of Commerce has voted the sum of 400*l*. to M. Berlier for the purpose of defraying the expenses of his further study of the problem.

It is proposed to transform the new hippodrome at Paris into a theatre to contain 15,000 seats, 3,000 of which will be at the popular price of 50 c. The scheme has been sketched out, and the cost is estimated at 20,000*l*. The State has been asked to contribute, and the Minister of Public Instruction has promised to support the request.

The Minister of Public Instruction has presented to the Louvre Museum the table and clock of marqueterie work which belonged to the office of the manager of the Imprimerie Nationale in the old Hôtel de Rohan. These objects formerly belonged to the family of Rohan.

The Société Nationale des Architectes has decided the competition organised under its auspices for a "Maison Maternelle," to cost the sum of 10,000*l*. The first premium is awarded to M. Parenty, architect, of Paris, who will also receive a prize awarded by the Minister of Public Instruction, and a silver medal from the Société. The second and third premiums are awarded to M. Dugué and M. Gaulard respectively.

It is stated that a decision has been come to regarding the immediate demolishing of the Galerie des Machines in the Champ de Mars, and that the building will have disappeared by next spring.

The Place du Carrousel in its present arid state has long been an eyesore to the Commission du Vieux Paris, and one of its members has put forward to the State a demand that the large open space be decorated as soon as possible with grass plots and flower beds.

The interior and exterior of the Cluny Museum are undergoing a thorough restoration, for some of the older portions are beginning to fall into a disastrous state of ruin. The state of the Carnavalet Museum building is also becoming a matter for serious alarm, and it is proposed to consolidate the threatening portions of the basement and the double depth of cellars on which this interesting building is constructed.

The publication of the new rules concerning the heights and projections of buildings at Paris, prepared by M. Louis Bonnier, architect to the City of Paris, has caused a certain dissatisfaction, as it is immediately applicable on publication. A number of architects, who, having already prepared their designs and details for work to be put into hand at once, are unable to comply with the new rules, have sent in a request that an exception be made in their case, so as to avoid an inconvenient modification of their designs. A conference on the subject of the new rules is announced.

The large hall of the Treasury Department at the Ministry of Finance in the Louvre is being entirely re-arranged and modernised as regards the arrangement of the paying and receiving offices. The foundations for the new pillars to support the upper portions have been constructed on the Cottancin system of armoured brick caisson work, permitting of shallow distributing foundations in the floor above the basement.

The acceptation of the Thomy-Thiery legacy by the Conseil d'Etat has made the long-discussed question of the departure of the Minister of Colonies from the Pavillon de Flore in the Louvre one of urgency. The

matter will now probably be decided at once, and M. Redon, the architect to the Louvre, has been commissioned to prepare the rooms for the reception of the collection and the public.

The numerous cases containing the objects of art left to the City of Paris by the late M. Dutuit have just been deposited at the Petit Palais, where M. Girault, the architect, is carrying out with all possible expedition the work necessary for their installation. There is, in fact, no time to lose, since if the collection is not open to the public by December 15 the legacy is void and the collection goes to Mme. Dutuit's residence at Rome. Unfortunately the Petit Palais, though externally a beautiful building, presents internally a bare interior in which everything has to be done; the State has presented to the City no more than the mere walls and floors; and before either the Dutuit collection or the municipal art treasures can be arranged there an amount of work must be done involving both much time and much expenditure.

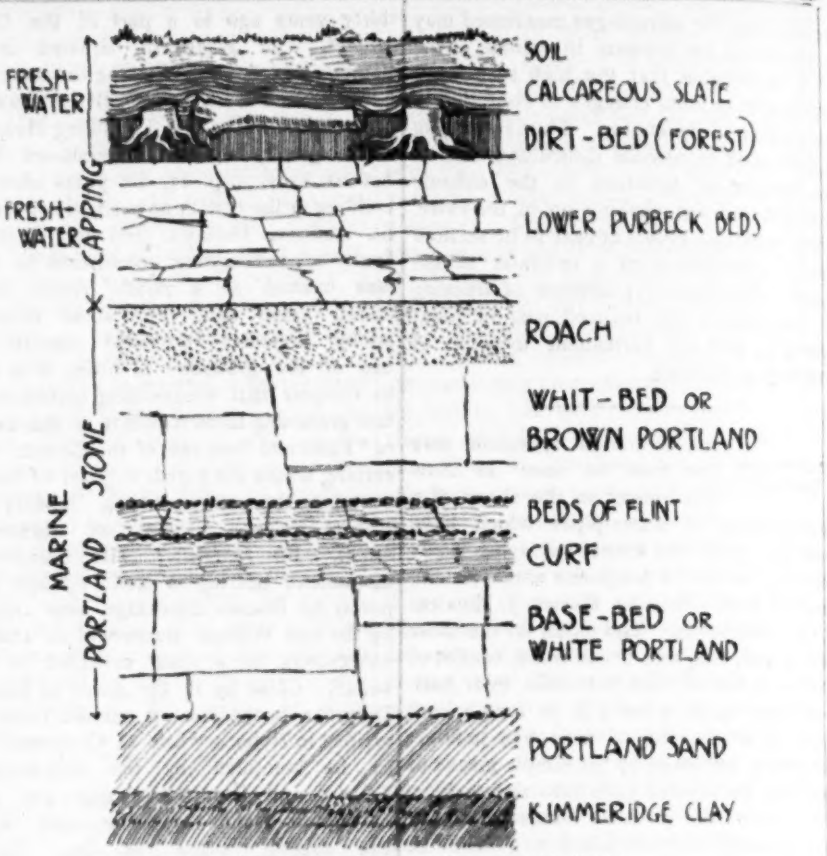
The general arrangement proposed is as follows: the great gallery along the principal front will receive the works in sculpture and the tapestries, with M. Frémiet's St. George and the Dragon as the central object. The Dutuit collection will occupy the southern portion of the interior, next the Cours la Reine. The large inner gallery will contain the antiquities, pictures, examples of French art of the seventeenth and eighteenth centuries, and the more remarkable of the works in enamel and faience. The engravings (including a number of etchings by Rembrandt), the drawings, and coins, will be placed in the gallery parallel with this. The modern pictures belonging to the Municipality, the number of which is continually on the increase, will occupy a neighbouring gallery and also a portion of the north side of the building, next the Champs Elysées. It is proposed to form in the basement a collection of sculptural and architectural models, reserving also a space for temporary art exhibitions.

At the Hôtel de Ville the recess of the Municipal Council has afforded opportunity for finally completing the interior decorations, which will be done when M. Olivier Merson has finished his paintings on the State staircases which were commissioned in 1899. On the same staircases M. Joseph Blanc has just completed a large cupola painting in which a group of female figures represent the Months of the Republican calendar, and M. Schommer a corresponding one in which the figures represent "Les Chansons des Rives de Seine." The large paintings by M. Chéret, representing Italian comedy, French comedy, and Pantomime, are being fixed up in a room decorated otherwise with white and gilded woodwork. M. Detaille's two great paintings of this year's Salon are now fixed in the Salle du Budget, where they have a very fine effect, and will probably be the prelude to other important official commissions to this artist.

M. Pascal, who completed last year the new buildings of the Bibliothèque Nationale parallel with Rue Colbert, has commenced the remaining block along the Rue Vivienne. The plan will necessitate the formation of two stories below the ground level. This block will complete the quadrangle.

M. Saglio, the curator of the Cluny Museum, is arranging, in the part of the museum known as the "Thermes de Julien," a new gallery which is intended to receive various ancient sculptures and engravings which, for want of space, have hitherto been hidden in a storeroom inaccessible to the public. The exhibition of these objects will be of much interest to archæologists, who will also be able there to see a portion of the ancient building in an unrestored condition.

The Champ de Mars continues to present the lamentable spectacle of the ruins of the last exhibition buildings; and at the Trocadéro, though M. Bouvard has restored the lawns and plantations to their former condition, the sculptures and the cascade seem to be left to go to ruin. It is much to be wished that the Municipal Administration would revive and carry out the scheme of the late M. Alphand for treating this piece of ground, for which he obtained from M. Fremiet a very decorative model for the basins of the cascade itself. Equally neglected is the scheme which Dalou had made for the treatment of the site around his great sculptural group in the Place de la Nation, with cascade effects resembling some of those of Versailles.



Section of Strata in Portland Quarries (No Scale).

While referring to the Trocadéro, we should not omit to call atiention to the interesting loan exhibition of Russian art at present on view in Ethnographic Gallery.

The monument to Balzac is at last erected, though not in the position originally granted to the Société des Gens des Lettres. It appears that the Metropolitan Railway was the obstacle to the site on the Place du Palais Royal, for which has been substituted a site at the junction of the Avenue de Friedland with the Faubourg St. Honoré. There is a suitability in this site owing to its proximity to the house long occupied by Balzac, and in which he died. The monument to Musset, which M. Mercié is just completing, is still to come, though it is not known yet whether it will be under the trees of the Place du Théâtre Français, the site originally proposed. At the Luxembourg Garden a sculpture representing a peasant woman of the Cevennes seated on a rock and caressing a goat, forms a piquant contrast to the Watteau memorial on an adjacent site. This new group, which has just been erected, is the work of M. Marqueste, and forms a monument to the novelist Ferdinand Fabre, who died some years ago. The monument to Charles Garnier, at the junction of Rue Scribe and Rue Auber, in the courtyard in front of the Opera library, is still veiled; the date of the inauguration is not fixed, but it will probably take place before the end of the year.

The death is announced, at the age of forty-six, of M. Courtois-Suffit, the well-known architect. He was an architect "diplomé" by the Government, and also an official architect of the City of Paris. He was a pupil of his father and of M. Pascal. The large quantity of work executed at Paris by the late architect is easily recognisable by the special characteristics visible in all the designs executed by M. Courtois-Suffit. He carried off a medal and a travelling scholarship at the Salon of 1883, and a medal at the Salon of 1886. He was Chevalier of the Légion d'Honneur, and member of the jury at the Exhibition of 1900.

Crematorium, Darlington. — The Darlington Crematorium, at the West Cemetery, Darlington, is the outcome of a limited company, formed in 1893, but which only decided to erect a building for the purpose intended in 1900. The crematorium was erected from plans prepared by Messrs. Clark & Moscrop, the incinerating apparatus being supplied and erected by Messrs. H. Simon & Co., Ltd., of Manchester. The cremating apparatus is a furnace of the regenerative type. There are three interior chambers.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

PORTLAND STONE QUARRIES.

A special summer visit was made by members of the Architectural Association on Saturday last, the 27th ult., to the Isle of Portland to inspect the stone quarries and working plant belonging to the Bath-stone firms. The party, numbering twenty-eight, including the new President, Mr. H. T. Hare, assembled on the previous evening at Weymouth, and made an early start the following morning at the express invitation of the owners, by whom a good supply of brakes was provided for the purpose of making the tour.

The working of a cable tramway was first explained, followed by a short inspection of the shipping wharves and the tackle employed. Incidentally the Government coaling station and the magnificent new breakwater were noticed. Practically speaking, the whole of the building stones of the Portland formation are quarried at the highest part of the island, which takes the form of a large table-land rising some 700 ft. and falling gently to the south. The tramway for a considerable distance is in common use by the various quarry-owners, and descends rapidly on the north side for convenient delivery of material to the shipping and rail wharves.

In making the ascent of the hill, a fine view of the famous shingle, Chesil Bank, was obtained, to which reference was made in our issue of September 6; a marked feature of this natural breakwater is the presence of the larger shingle at the end of the current which washes the shore of the island, the smaller stones being found at the western end of the bank some eleven miles distant. Here also was seen the general bare character of Portland, with almost an entire absence of trees and with cold colour effects produced by the silver-grey weathering of the stonework of the dwellings and boundary walls of the fields. It was also noticed that very few buildings showed up the fine qualities of the material so abundantly found at hand.

At the summit of the island the members were driven round to the numerous quarries and workshops of the Bath Stone Firms. The quarrying of Portland stone has been going on for some centuries, but it was not till about A.D. 1619, during the building of the Banqueting Hall at Whitehall, that an extensive use of the stone appears to have been made; later, a very large supply was shipped to London for St. Paul's Cathedral: the approximate position of the quarry from which this material was

drawn was pointed out, and some large stones lying in the quarry were stated to be material disused or rejected by Wren.

In almost all the quarries a clear view was had of the various strata comprising this important formation, which for all practical purposes are referred to under three heads: the top layers are called the *Capping*, which is entirely waste material, overlying the *Whit-bed*, and under this is the *Base-bed*.

The capping, varying in depth from 15 ft. to 20 ft., consists of a loam resting upon beds of loose freshwater calcareous slate, below which is the "dirt" bed about 18 in. thick, containing remains of an ancient forest; the silicified stumps and trunks of coniferous trees are frequently found, partly buried in the vegetable earth of the dirt bed and partly covered by the loose slate; the remainder of the capping is made up of freshwater lower Purbeck beds. We were much struck by the enormous amount of waste in these useless layers before the best beds were reached.

Then follows a peculiar shelly stratum of stone, termed *Roach*, averaging 4 ft. thick, overlying the famous Whit-bed, or brown Portland. The roach formation proved a source of much interest to the party; a discussion of its properties led to the expression of a general desire for using it in ashlaring, as being coarser, and, by reason of its shells and small cavities, as possessing greater texture than the beds in general use. At present it is not employed as a dressed stone, although in roughly squared blocks it is very suitable for engineering works; a large quantity is now being used in the construction of the new Portland Harbour breakwater, after having been subjected, with granite, to a gun-fire test. Although seen in cottage walls, roach is not to be found in any large building on the island, with the exception of the ashlaring on St. George's Church, a small Classic edifice with domed crossing, commenced in 1754 and finished in 1766; from the present condition of the work the material has not been affected in any adverse way during the 148 years that have elapsed. The working depths of the Whit-bed or brown Portland vary from 7 ft. to 10 ft.; the material is quarried by a wedging process, to which it is well adapted by reason of the fissures in the rock; the larger blocks seldom exceed 10 tons in weight, and the average contents is about 145 cubic ft.; 16 ft. to a ton is the quarry weight of the stone.

Well defined solid beds of flint separate the Whit-bed from the Base-bed or white Portland; this is a stratum of similar depth of a much finer quality, more easily worked but of smaller capacity for weathering, than the Whit-bed; until recent years it has scarcely ever been quarried, for which no explanation has been found beyond the reasons just stated. Like the overlying stratum, the upper layers of the Base-bed consist of an inferior material called "curf." Portland stone ends in this Base-bed and is followed by a very deep bed of sand to which the term Portland is applied by geologists.

Not the least interesting were the quarries recently opened at the edge of the sea-cliff near the south end of the Island, for they afforded an excellent study of the formations and of the action of seawater upon the material.

No pains were spared by the owners and their representatives to make the visit both interesting and instructive. Mr. Sansom, the manager, carefully explained the methods of quarrying and hauling; the means by which the respective beds are recognised; matters relating to cost in production, and gave much other useful information arising out of the questions asked by the visitors. Amongst the latter, the fact that the better kinds of Portland stone can be laid in a building "face bedded" as well as on the "natural" bed, occasioned general surprise, and suggested economy in use. At the workshops and sawing yards the steam plant, comprising horizontal quick and slow stroke saws, moulding and sinking machines, lathes, &c., were keenly inspected; but the chief interest centred round a 9-ft. diamond-toothed circular-saw, which, at varying speeds, cuts through a 4-ft. block of Portland stone at the rate of 6 in. per minute. Another machine attracting great attention was a steam "channeller." In quarries where natural fissures are absent, this powerful machine running along a small railway cuts channels, by vertical strokes, for wedging purposes, 4 in. wide at the mouth, diminishing to 1 in., and to a depth of 10 ft. if necessary. The steam-cranes were specially set to work and large blocks were dislodged and hoisted with remarkable ease and rapidity.

By far the greater part of the stone quarries of the island are now owned by the Bath stone firms—representing, roughly speaking, an area of about 700 acres—who, during their brief ownership, have cleared a very large amount of "capping," ready for expeditious quarrying of the stone. About 100 steam and hand power cranes are at work, and 450 quarrymen, besides a large staff of masons, are employed, giving an average output of 300 tons per week. A great number of blocks were seen squared up and stacked ready for dispatch to the various Government buildings now in course of erection in London. After lunch, which was kindly provided by the proprietors, a visit was made to the church already referred to, and to the quarry museum. This latter is located in a disused tramway arch passing under one of the main roads, and contains specimens of fossil trees, ferns, marine and fresh water shell-fish, stalactites, stalagmites, and other remains. Returning to the station, a close inspection of the Chesil Bank was made, bringing a thoroughly enjoyable and instructive day to a close.

THE WOLVERHAMPTON ART AND INDUSTRIAL EXHIBITION.

It is perhaps to be regretted that this exhibition, following so closely on the heels of that at Glasgow, will inevitably be compared with it. Undoubtedly the palm must be awarded to Glasgow, but when the population of the two towns is taken into consideration, it must be admitted that Wolverhampton has done exceedingly well. The comparison extends not only to the number and variety of the exhibits, but also to the design of the buildings in which these are shown. The architects of the Wolverhampton buildings, Messrs. Walker & Ramsey, have flattered Mr. Miller by imitating the general character of his designs for the Glasgow Exhibition, and have succeeded in producing buildings which are not only interesting to the architect, but well adapted for their purpose. The construction is, of course, flimsy — wood framework for the walls, light wood trusses for the roofs, and corrugated iron for the roof-coverings. The walls are cased externally with fibrous plaster, and the exposed woodwork is painted—but our readers will guess the colour. The roof-trusses of the Industrial Hall have semi-circular arched ribs built up of boards, like those of the Grand Avenue at Glasgow, and many of them have buckled laterally to a very serious extent, although the roof covering is so light. The spans are a little over 50 ft. The trusses over the Machinery Hall have longer spans, and are of the arched lattice type with horizontal tie-beams. We believe that some of the materials from the Glasgow Exhibition have been used in the Wolverhampton buildings, and, if this is the case, it accounts for the similarities we have noticed. But there is undoubtedly a good deal of new work, for which credit must be given to Messrs. Walker & Ramsey.

The different classes of exhibits are, on the whole, grouped in a convenient manner, so that the visitor desirous of inspecting all the exhibits in any class has not much difficulty in finding them. Nearly all the exhibits are to be found in the two main blocks, known as the Industrial Hall and Machinery Hall. A separate building of smaller size is devoted to Canada, and some other exhibits are placed in small buildings scattered about the grounds. The "Art" collection is in the permanent Art Gallery in the town.

The first exhibit in the Industrial Hall to which we shall draw attention is that of the Cannon Iron Foundries, Ltd., of Deepfields, near Bilston. The stand (No. 2) contains a miscellaneous collection of "porceliron" ware —that is to say, porcelain-enamelled iron— among which are a well-made bath with exposed standing waste and overflow, a range of three round-fronted lavatory basins, and a wash-down water-closet (galvanised outside) with S-trap in the same piece as the basin; the trap has an inspection-cover bolted to the crown, and a "porceliron" rim is bolted to the top of the basin. Messrs. M. Cockburn & Co., of Falkirk (No. 8), and Messrs. Ward Bros., of Wolverhampton (No. 9), exhibit the commonplace kinds of registers, mantels, and lavatories, which are found in the catalogues of so many builders' merchants; the former firm has some ingenious clore or open kitcheners, one type being adapted for coal or wood fires. Messrs. Parkinson and W. & B. Cowan, Ltd., of Birmingham (No. 10), show a number of gas-fires and stoves of the usual characterless designs, and some good gas-cookers, wet and dry meters, &c. Stand No. 12 (Messrs. Benjamin Parkes & Sons, Ltd., Woodsetton Works, near Dudley) contains a very ugly hat and umbrella stand, and a good hammered-metal fire-grate interior with curb and dogs, in addition to some well-designed wood mantels executed by Messrs. Phillips & Jones, of Wolverhampton.

From the architect's point of view the exhibits of Messrs. Martyn & Co., Ltd. Cheltenham (No. 13) are much more satisfactory. They include a massive "Georgian" door and frame designed by Messrs. A. B. & E. M. Thomas, of London; a quaint chimney-piece, designed by Mr. E. Goldie, F.R.I.B.A.; a coved plaster ceiling, by Mr. R. A. Briggs; a wood mantelpiece (of a stone character rather than wood), by Messrs. Banister Fletcher & Sons; a model of the exhibitors' first premiated design for the Queen Victoria Memorial at Liverpool; and photographs of works executed for Mr. Fellowes-Prynne and others. Stained glass windows, by Mr. Martin Dunn, of West Bromwich, are shown at Stand No. 15, and among them we noticed some well-designed and effective leaded lights with bevelled glass and lead only ⅛-in. wide. Messrs. Walters (Wolverhampton), Ltd., show a number of ventilating appliances at the next stall. The extract ventilators are of the well-known type, with vertical baffle-plates. An attempt has been made to give some variety to the designs, but the Russian-looking bulbous tops are not very pleasing. Among the other appliances are mica-flap air-inlets for drains, and various kinds of air-inlets for rooms.

Perhaps the brickmakers in the country around Wolverhampton think that their goods are too well-known in that town to need any advertisement. At any rate, the only exhibit of this kind which we noticed is that of Messrs. Peter Wood, Ltd., of West Bromwich (No. 21); a varied assortment of bricks, paving, coping, &c., is shown (chiefly "blue"), and all appear to be true in shape and of good quality, but it would have been better to show a few "bats."

Messrs. George Howson & Sons, Ltd., of Eastwood, Hanley, have a good show of sanitary fittings at No. 22, but as the exhibits do not differ materially from those shown by this firm at the Manchester Health Exhibition and noticed in our columns last week, we need not review them in detail. The bricklayer and general contractor will pause to look at the pickaxes and spades shown (among other things) by Messrs. John Perks & Sons, of Wolverhampton, at No. 26, and the painter will find something of interest in stall 38, where Messrs. Read Bros. & Co., Ltd., of Wolverhampton, exhibit varnishes of different kinds. The next stand is of more interest to architects and surveyors, as it contains a good collection of instruments of various kinds by Messrs. J. Halden & Co., of Manchester.

Messrs. Parker, Winder, & Achurch, Ltd., of Birmingham (No. 40), show a number of Messrs. Shanks & Co.'s sanitary fittings, together with Eagle ranges and grates and stable fittings. Brass, copper, and steel tubes for different purposes will be found at No. 41 (Messrs. Earle, Bourne, & Co., Ltd., Birmingham). The Carron Co. (No. 43) exhibit stable fittings, stoves, ranges for coal, steam, and gas, and a good porcelain-enamelled iron bath: among the most interesting exhibits of an ornamental character is a hammered copper "interior" for a fireplace. Some excellent beaten copper and brass interiors will also be found at Mr. J. H. Butler's stand (No. 46), together with oxidised copper electroliers of good design. The "Homely" sunk fire made by the Griffin Foundry Co., of Birmingham, is also shown; the fireclay back is surrounded with small peacock-blue glazed bricks and pilasters, which support a wood overmantel with beaten copper panels, the whole having a touch of originality. Among the smaller articles some quaint coal scuttles of beaten copper are worthy of mention. Mr. Butler's works, we are pleased to note, are at Wolverhampton.

Among a miscellaneous assortment of commonplace firegrates, &c., at the next stall (Messrs. S. Smith & Son, Ltd., Smethwick), there are a few exhibits of very good design, including a simple cast-iron bedroom mantel, an armoured steel interior, and two or three panels of cast-iron railing.

The Silicate Paint Co., Ltd., of Charlton,

London, show at No. 49 some decorative designs in duresco, which show that effects brilliant or subdued can be obtained with the material; the artists' names are given. At No. 59, Mr. G. Faulkner Armitage, of Altrincham and London, exhibits a building of two rooms fitted up as "an entrance hall and a sitting-room," but the stairs are partly open to both rooms, and this is an arrangement which appears to sacrifice comfort and utility to picturesque effect. The whole is a good example of domestic design. In close proximity to this are the exhibits of cabinet work by Messrs. Thomas Edwards & Son, Messrs. R. Stroud & Son, Ltd., and Messrs. Phillips & Jones, all of Wolverhampton. The first-named firm has a well-designed stand containing some oak sideboards of quiet design.

The next firm is in the "wholesale" trade, and much of their work is such as it is impossible for us to admire; a dressing-table, however, furnishes an interesting exception. Messrs. Phillips & Jones exhibit three rooms decorated and furnished as drawing, dining, and bed rooms. The dining-room furniture is of good character, but the imitation-wood dado is like the fly in the ointment. The drawing-room suite is overloaded with ornament, and the brass handles, &c., look tawdry and cheap.

We pass on to No. 72, where Messrs. Pilkington's Tile and Pottery Co., Ltd., of Clifton Junction, near Manchester, exhibit specimens of their well-known wall and floor tiles, mosaic, &c. The stall is a simple but pleasing structure, with two arches on one side and one wide arch on the other, and is faced outside with egg-shell-glaze tiles of different tones of yellow. Inside these are several coloured ornamental panels. The tiles are of good quality, and the designs generally are worthy of high praise.

The locks and latches on all the doors in the exhibition buildings have been supplied by Messrs. Chubb & Sons' Lock and Safe Co., Ltd., of Wolverhampton and London, and other specimens of this firm's goods will be found at Stand 77. The principal exhibit is a strong-room, with artillery-tested door controlled by three locks, namely, a chronometer or "time" lock, a keyless combination lock, and a lever lock with keys so small that one of them is mounted under the signet of a finger-ring. A safe, specially designed for architects, surveyors, and engineers, is also worthy of notice; it is fitted with fourteen sliding metal trays for plans. Among the other interesting exhibits are many different kinds of locks and "safe deposit" fittings. Safes and locks of various kinds are also shown by Messrs. Geo. Price, Ltd. (No. 94), Mr. R. M. Lord (No. 97), Messrs. Cyrus Price & Co., Ltd. (No. 99), and Messrs. Thos. Skidmore & Son (No. 118), all of Wolverhampton. Messrs. Lowe & Fletcher, of Willenhall (No. 85), Mr. James Gibbons, of Wolverhampton (No. 95), Messrs. Thos. Sutton & Son, of the same town (No. 119), and the Co-operative Padlock Society, Ltd., of Walsall (No. 132), exhibit locks and other brassware and builders' ironmongery in considerable variety. Mr. Gibbons also shows some good fanlight openers, and copper and brass door-handles and plates, to which the much-abused word "artistic" may fitly be applied. At No. 96 Messrs. Green & Russell, of Wolverhampton, have an exhibit of builders' black ironmongery, including Norfolk latches of good design. Other examples of local industries will be found at No. 102, where Messrs. Wm. Miller & Sons, Ltd., show various kinds of hurdles, unclimbable railing, gates, &c., of the ordinary type of design, but well made, and at No. 120, where there is a good display of galvanised iron sheets, &c., by Messrs. Geo. Adams & Sons, Ltd.

Another local industry represented in the Exhibition is that of enamelled-iron advertisements and signboards, but the productions are in the main so hideous that it will be a kindness to withhold the names of the exhibitors; one of the firms has the hardihood to include the word "Art" in its name, and if this indicates that it has some worthy aspirations in this direction—although there is no evidence of it at present—we venture to suggest that it should apply to the Municipal School of Art, whose exhibit (No. 104) shows that Wolverhampton need not continue to offend the eyes of railway travellers with such glaring examples of ugliness as it has produced in the past.

In the Machinery Hall there are not many exhibits of particular interest to our readers. Electrical engineering is represented by the Electric Construction Co., of Wolverhampton (No. 225), Messrs. Heenan & Froude, of Birmingham (No. 226), Messrs. D. Bruce Peebles & Co., of Edinburgh (No. 227), Messrs. Crompton & Co., Ltd., London (No. 238), Messrs. Ferranti, Ltd., of Hollinwood, near Oldham (No. 244A), Messrs. Bever, Dorling, & Co., Ltd., Dewsbury, and the Phœnix Dynamo Manufacturing Co., Bradford (No. 260), Messrs. D. Selby Bigge & Co., Newcastle-on-Tyne (No. 261), the Hiram Maxim Lamp Co., Ltd., London (No. 267), the Edison & Swan United Electric Light Co., Ltd. (No. 275), and others. Gas engines by Messrs. Crossley Bros., Ltd., of Openshaw, near Manchester, the National Gas Engine Co., of Ashton-under-Lyme, and Messrs. Tangyes, Ltd., of Birmingham, are shown at Nos. 210, 211, and 256. Messrs. R. Becker & Co., of London (No. 239) have an interesting display of Kiessling's wood-working machinery, including a copying-machine, dovetailing-machine, and sand-papering-machine, in addition to machines for circular sawing, band sawing, planing, moulding, tenoning, &c. At the next stall English wood-working machinery is exhibited by Messrs. J. Sagar & Co., Ltd., of Halifax. It is interesting to find that a family which originally gained its name from its inherited trade of sawyer (for *sagar=sawyer*) should to-day be making woodworking machinery. But sawing is not the only branch of the existing firm's work; among the exhibits are machines for dovetailing, planing, moulding, boring, mortising, and other details of the joiner's trade. Another exhibit of the same class is that of Messrs. Thos. Robinson & Son, Ltd., of Rochdale (No. 243). A fine band-saw operated by a skilful workman is an interesting feature at this stand.

Messrs. E. J. & J. Pearson, Ltd., of Stourbridge (No. 209), have a display of fireclay ware, including "Teale" and other firebacks, and patent angular-contact boiler seating blocks with asbestos packing. Excellent salt-glazed and enamelled bricks are shown by the Farnley Iron Co., of Farnley, near Leeds, at No. 213, together with a combination sink, and other glazed ware. Wrought-iron and steel tubes for different purposes, and various kinds of flanged joints, coils, &c., are exhibited at No. 216 by Messrs. Lloyd & Lloyd, Ltd., of Birmingham and Halesowen. The Smoke Prevention Co., Ltd., of Blackburn, exhibits a working model of the E.S.E. patent mechanical stoker, which is worth inspection. Mention should also be made of the goods and passenger lifts of Messrs. Holt & Willetts, Cradley Heath (No. 246); Messrs. Hughes & Lancaster's "Shone" pneumatic ejector for raising sewage (No. 258); Messrs. Edward Preston & Sons' rules and hand-tools for carpenters and joiners (Birmingham); Mr. C. H. Matthews's joiners' cramps, vices, hand-power machines, and ingenious brackets for supporting planks from ladders (Wolverhampton); and Messrs. James Stott & Co.'s ventilating fans and cowls and gas-governors.

In the Canadian pavilion there is not much of special interest to the architect, engineer, or builder. The large collection of Canadian timbers is well worth study, but that labelled "yellow pine" is not the wood known by that name in this country. Gilmour's patent doors, made at Trenton in Canada, are a novelty. The framework has a core of soft wood, either solid or built-up, and is ploughed longitudinally to afford a key for ¼-in hardwood facings, the backs of which are ploughed to correspond. It is claimed that the doors are lighter and cheaper than solid hardwood doors, and that they cannot warp or twist.

In the Exhibition grounds we noticed a one-storied club-house, by Messrs. Humphreys, Ltd., of Knightsbridge, London, constructed of timber framing, covered outside with felt and corrugated iron, and inside with match-boarding. Another building, exhibited by Mr. C. N. Parkin, of Wolverhampton, has the walls formed with "Mack" patent partition slabs, and a flat vulcanite roof, and appears to be thoroughly satisfactory. Messrs. Davies Bros. & Co., Ltd., of Wolverhampton, have a corrugated iron shed containing a good selection of galvanised-iron sheets, tanks, dust-bins, barrows, &c. Messrs. C. Wüst & Co., of Seebach-Zurich, exhibit electrical machinery in a small timber building of characteristic Swiss type. The "Little Giant" pneumatic tools and compressed-air appliances are shown by the International Pneumatic Tool Co., Ltd., of Westminster; and Messrs. Lockerbie & Wilkinson, of Birmingham, have an interesting display of automatic and non-automatic acetylene-gas generators, including portable lamps for contractors, in addition to abattoir fittings and folding partitions. A peal of six bells by Messrs. Charles Carr, Ltd., of Smethwick, is shown in a picturesque little tower with octagonal spire.

The sanitary fittings throughout the Exhibition have been supplied and fixed by Messrs. George Jennings, Ltd., of Lambeth. We noticed a new kind of independent urinal, in form like a sugar-loaf hollowed out on one side; it stands clear of the wall and is about 3 ft. 6 in. high, and the base is formed into a tray and provided with an outlet-grate. The plumbing is well done.

Reference should also be made to the railings and gates supplied by Messrs. Bayliss, Jones, & Bayliss, of Wolverhampton, and to their two well-designed electroliers and brackets in wrought-iron and copper which sweep up the faces of the two towers flanking the main entrance of the Machinery Hall, to the height of about 30 ft.

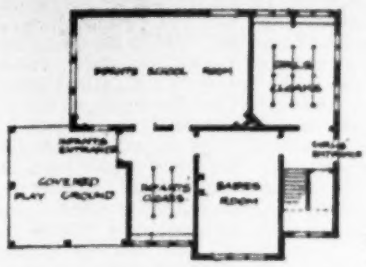
An interesting feature of the Exhibition is the method adopted for driving the various machines. Instead of the usual arrangement of shafting and countershafting and a crowd of belts, it was decided to establish "a thoroughly up-to-date electricity station," such as might be erected in a town of moderate size. Different firms have co-operated in carrying out this idea, and the result has proved eminently satisfactory. Main underground cables have been laid down by the British Insulated Wire Co. from a central switch-board (lent by Messrs. Ferranti, Ltd.) to convenient distributing centres, from which energy is taken for lighting and motive power. Exhibitors of machinery have provided their own motors, but current has been supplied free. The wire for the arc-light circuits inside the buildings has been supplied by Messrs. Isidor Frankenburg, Ltd., and that for the overhead circuits in the grounds, consisting of a single strand of bare aluminium wire, by the British Aluminium Co. The arc lamps in the main halls and part of the grounds are those of the Brockie-Pell Arc Lamp Co., of London. "Edison-Swan" and "Hiram-Maxim" incandescent lamps have been fixed in the smaller buildings and offices.

The Exhibition will remain open to the end of this month.

ARCHITECTURAL SOCIETIES.

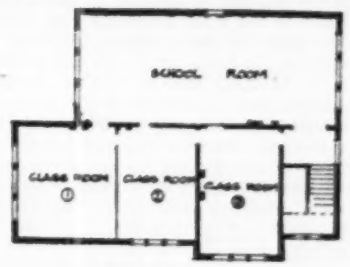
Northern Architectural Association (Newcastle-on-Tyne).—Architectural classes in connexion with this Association are to be conducted by Mr. R. P. S. Twizell, who will give instruction at the Durham College of Science, on Tuesday evenings in design, on Thursday evenings in the principal architectural styles. It is announced also that a friend of the Association has offered a prize of 5*l.* towards the expenses of a student who will spend at least a fortnight in England or ten days abroad, and who sends in, under motto, by not later than July 31, 1903, a set of drawings consisting of three single and separate perspective architectural sketches, in pencil, ink, or colour, each on sheets size 15 in. by 11 in.; and three sheets of measured drawings, each sheet not larger than 40 in. by 26½ in. It is proposed that the successful competitor receive a book value 10*s.*, suitably inscribed, and a sum of at least 2*l.* 10*s.* towards his expenses at the commencement of his tour, and the balance at completion, on his submitting approved evidence of his having made measured drawings or sketches during his tour. It is also desired that the student shall keep a diary, with architectural notes, to be submitted with his other work, so that the whole may be brought before a general meeting should the Council desire it.

Building Trades Exchange, Harrogate.—The members of the various businesses connected with the building trades of Harrogate and district have secured rooms in the Central-arcade, Chapel-street, on a lease, and have established a Building Trades Exchange and Club. One of the principal objects has been to have a suitable meeting-place for the members to have business and social intercourse, and the club is to be run on similar lines to the one at Halifax. The suite includes large billiard-room, smoke-room, reading and committee rooms, and stewards' rooms. The capital is 1,000*l.*, divided into 1,000 shares of 1*l.* each; each member will be a shareholder, but no member is to hold more than twenty shares. Mr. Riley Fortune (President of the Harrogate and District Builders' Association) presided, and the Mayor (Alderman D Simpson) declared the premises open.



Ground Plan.

New GIRLS and INFANTS SCHOOLS St Peters in Thanet



First floor Plan.

NEW GIRLS' AND INFANTS' SCHOOLS, ST. PETER'S-IN-THANET.

THE foundation-stone of these new "voluntary" schools was laid last October by the Archbishop of Canterbury, and the building is now nearly completed. It is situate in Ranelagh-grove, St. Peter's, on land presented by Mr. Anthony Cobb, of Margate.

The accommodation required by the managers was for 122 infants and 214 girls, and they have been placed on the ground and first floors respectively. The area of the upper floor is therefore considerably greater than that of the lower, and this has allowed of a covered playground being provided, as well as cloakrooms on the ground floor. A teachers' room, with inspection windows into each infants' room, is arranged on a mezzanine floor over the girls' cloakroom, with lavatory, water-closet, and stockroom adjoining. Latrines for the children are arranged in the playground behind the schools.

The walls are built of stock brick, and distempered internally. Externally the upper portion is rendered with rough-cast, the plinth being of hard blue brick, and the portion below the same is faced with red brick, as are also the external arches. The warming is effected by slow-combustion fireplaces, and ventilation is provided for by extract flues arranged alongside smoke flues, with Tobin's tubes as inlets in the angles of the rooms.

The cost, including tar-paving of playground, &c., amounted to a little over 2,500*l.*, or about 7*l.* 12*s.* per head. The builders are Mr. J. T. May, of Broadstairs; and Mr. J. E. Newberry, of Westminster, and Mr. H. Bertram Langham, of Ramsgate and Broadstairs, are the joint architects. The drawing from which the illustration is taken was in this year's Academy Exhibition.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A MEETING of the Midland Counties' District of the Incorporated Association of Municipal and County Engineers was held at West Bromwich on Saturday, September 27. The members assembled in the Institute, where they were received and welcomed by the Mayor (Mr. J. H. Chesshire). The President (Mr. T. H. Yabbicom, C.E., of Bristol) was in the chair, and among those present were Messrs. J. Price, Birmingham; J. T. Eayrs, Birmingham; A. D. Greatorex, West Bromwich; J. Lobley, Hanley; J. Lemon, Southampton; A. T. Davis, Shrewsbury; E. P. Hooley, Nottingham; A. E. Collins, Norwich; J. S. Pickering, Nuneaton; W. H. Hopkinson, Keighley; J. S. Yates, Waterloo; T. Henry, Retford; T. W. Franks, Lewes, and many others.

The Mayor, in welcoming the members, expressed his conviction that the meeting would be an instructive one, especially the visit to the sewage farm to inspect the bacteria process.

The President, in acknowledgment, said it was the aim of the Association to acquire information by visits to works.

On the proposition of Mr. J. T. Eayrs, Birmingham, Mr. J. S. Pickering, of Nuneaton, was re-elected Honorary Secretary for the Midland District.

Mr. A. D. Greatorex, Assoc.M.Inst.C.E., Borough Engineer, read a paper on "Municipal Work in West Bromwich." He said the town was well supplied with the various public institutions necessary for a well-governed town, such as a town hall, law courts, free library, and institute. The new art school, the generous gift of Mr. G. H. Kenrick, just completed,

from the designs of Messrs. Wood & Kenrick, was one of the most complete and up-to-date of its kind in the country, affording every facility for the teaching of arts and crafts. The historic building known as Oak House was purchased and presented to the town by the late Alderman Reuben Farley, J.P., in 1898. The work of restoring the building and laying out the grounds occupied nearly three years, and was carried out under the supervision of Messrs. Wood & Kenrick, at the expense of the donor. The building is used for a museum, and is well patronised. The Council owned the gas and electricity works; water was supplied by the South Staffordshire Water Co.; and as regards parks and recreation grounds, the town possessed four, having a total area of about 96 acres. The sewers were constructed from designs and under the supervision of Mr. J. T. Eayrs, M.Inst.C.E. A sum of 120,724*l.* had been expended by Mr. Eayrs in the construction of the sewers, purchase of land for sewage farm, laying out areas, house connexions, and other works, up to March, 1898. Since that date a further sum of 5,111*l.* had been expended by him in under-draining additional areas, erection of bailiff's house, farm buildings, laying on water supply, and construction of bacteria beds, &c., making a total to date of 125,835*l.* The sewage farm (Friar Park) was situated in the valley of the River Tame. The area of the farm was 230 acres, of a very variable character, including agricultural land, woods, waste ground, and pit mounds; some portions had been laid out for intermittent filtration and broad irrigation, whilst some portions of the pit mounds had been levelled, and were at the present time used for sewage treatment, but with unsatisfactory results. The sewage was delivered at the farm by two main sewers, a high and low level, the average daily dry-weather flow of both sewers being:—Low level, 800,000 gallons; high level, 400,000 gallons—a total of about 1,200,000 gallons. The low-level sewage, as was indicated by the analysis of the crude sewage, was comparatively weak, although it contained a certain amount of manufacturers' waste, including waste products from tar distillation works.

The Corporation did not allow acid or wash water from galvanising works to discharge into the sewers. The mean of eighteen analyses, after the removal of suspended matter, gave—

	Parts per 100,000.
Oxygen consumed in four hours...	3·251
Albuminoid ammonia	0·319

It was treated on the intermittent principle on the low-lying areas at the farm, which had an area of about 43 acres, and some portion was also pumped on to two areas at a higher level, which had an area of about 21 acres. The high-level sewage was also a dilute one, though of rather a stronger character than the low-level; it was free from admixture with manufacturers' waste except from breweries, the mean of eighteen analyses after the removal of suspended matter giving—

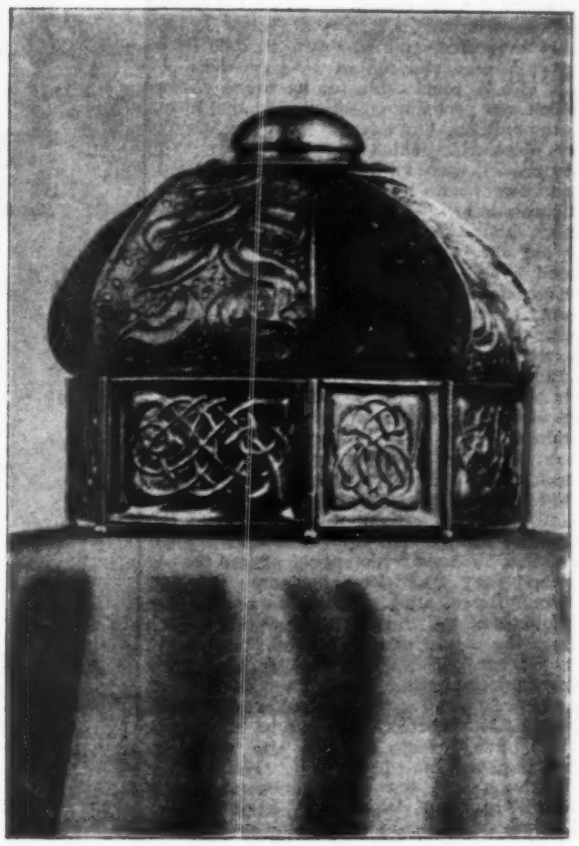
	Parts per 100,000.
Oxygen consumed in four hours...	5·034
Albuminoid ammonia	0·626

It was delivered by a 24-in. hydraulic main on to the top of the farm, where there were two small detritus tanks having a capacity of about 25,000 gallons each. The sewage was distributed on the filtration areas, which had been prepared by levelling some of the pit mounds, but this land was entirely unsuitable for the purpose; the sewage percolated through it in dry weather, and in wet weather it lies on the surface, thereby creating a nuisance. Owing to the large quantity of sewage delivered by both levels on the sewage farm, to the great majority of the houses being now connected to the sewers, and to complaints, it was found impossible to deal with the sewage in a satisfactory manner. It was impossible to obtain additional land suitable for the purpose, and it became necessary, if a good effluent was to be produced, that a precipitation scheme or some form of bacterial treatment should be adopted.

In April, 1897, he prepared and submitted to the Town Council a report on the then present and proposed treatment of the sewage at Friar Park. In this report two schemes were suggested, one a chemical and the other a biological scheme. The working expenses of the chemical scheme appeared so very large, as against the working expenses of a biological scheme, that he, in view of the experiments successfully carried out, strongly recommended the Council to adopt the latter, and in October, 1897, submitted a scheme in detail. After duly considering this scheme, the Committee recommended the Council to approve of the construction of one coarse-grained bacteria bed and one fine-grained bed on the high level, at an estimated cost of 2,000*l.* The Council approved of the Committee's recommendation. Both the coarse-grained and the fine-grained beds on the low level were 120 ft. long by 60 ft. wide, constructed at right angles to the main outfall conduit, the walls being built of 18-in. brickwork in cement mortar on 6-in. Portland cement concrete foundations, the floor of the beds also being of concrete 6 in. thick, the substrata being clay. The average depth of the filtering material in the coarse-grained bed, which was screened engine-ashes from ½-in. to 2-in. mesh, was 3 ft. 6 in., and the average depth of the material in the fine-grained bed, which consisted also of screened engine-ashes from ¼-in. to ⅜-in mesh, was 3 ft. The sewage reached the coarse-grained bed by means of three 15-in. penstocks, direct from the main outfall sewer. The troughs for distributing the sewage were iron, 15 in. wide, laid upon the surface of the filtering medium. The beds were not under-drained, but had six 4-in. sluice valves on either side connected to 6-in. and 9-in. cast-iron pipes, which discharged into manholes at the bottom end of the beds. This system of emptying the beds had been found to be highly satisfactory. The coarse-grained bed discharged into the fine-grained bed, and the fine-grained bed discharged into a 12-in. earthenware pipe which was connected to a pump-well near the engine-house, from which the effluent was lifted. Each of the beds had an effective area of 800 square yds., or one-sixth of an acre. The coarse-grained bed construction on the high level was 60 ft. long by 42 ft. wide, adjoining the existing detritus tanks, built in a similar manner to the low-level beds, with an average depth of filtering materials of 3 ft.; the sewage passed first through the detritus tanks, then through two 15-in. valves on to the bed, being distributed by means of two 15-in. cast-iron troughs; the outlet for the filtrate was by means of six 4 in. valves connected to 6-in. and 4-in. cast-iron pipes, discharging into two manholes, and thence by means of a 9-in. earthenware pipe on land which took the place of the fine bed. The sewage flowed into the coarse-grained bed until the water level had nearly reached the top of the material; the inlet valves were then closed, and the bed allowed to stand full during about two hours. The water was then emptied into the fine-grained bed, and a rest-period of equal duration allowed. The beds were allowed to stand empty for three hours, and were used three times every twenty-four hours. The final effluent was clear, entirely without odour, remained perfectly sweet on keeping, and was fit to discharge into the river Tame, however small the relative volume of the river. The object of these beds was to determine whether the sewage of West Bromwich could be successfully treated by the biological system at all times of the year. A further object of the fine-grained bed on the low level was to prove whether the effluent could be satisfactorily purified without any application to land, so that by the construction of such beds a saving could be made in pumping. The beds constructed were so arranged that they would be permanently utilised to purify sewage; consequently, no expenditure on structural works or materials had in any case been wasted or lost. The average amount of suspended matter contained in the sewage was 77·39 parts per 100,000, or 54·17 grains per gallon, and the analyses showed that the matters in suspension in the crude sewage were reduced in the filtrate from the coarse-grained bed to 9·34 per 100,000, or 6·54 grains per gallon, and were still further reduced to 0·95 parts per 100,000, or 0·68 grains per gallon in the final filtrate from the fine-grained bed. The effluent from the land contained traces only. The reduction of the oxidisable matters in solution was from 3·251 to 1·512 parts per 100,000, and then to 0·457 parts per 100,000, thus showing an average reduction equal to 53·4 per cent. by the coarse-grained beds; and a total reduction equal to 85·9 per cent. by the combined beds. The total purification after land treatment was 88·9 per cent., the oxidisable matter being reduced to 0·360 parts per 100,000. The reduction of the nitrogenous matter, as indicated by the albuminoid ammonia, was in like manner 47 per cent. by the coarse-grained bed, and 78·6 per cent. by the combined system. The total purification after land treatment was 82·4 per cent. In addition to the above test, on six occasions samples of the effluent from the fined-grained bed were at a later date submitted to the incubator test of the Manchester experts, and the results were satisfactory. The results had been all that could be desired, and after twelve months' working the beds were in as good a condition, and as free from nuisance, as they were after the first filling. The analyses showed distinctly that the effluents attained such a degree of purity that they could be safely discharged into any watercourse, even should such become dry during the summer. The degree of purification effected was such as to reduce the quantity of organic matter in the effluent to one-third of that generally considered permissible in a first-class effluent, whilst, on the other hand, the degree of aëration maintained by the effluent was such that fish could live and thrive in it, the aëration in the effluent after it had been kept for twenty-four hours in a quiescent condition being from 67 to 72 per cent. of the total maximum possible. The bacterial treatment had been found to be efficacious at all seasons of the year, the temperature of the sewage being sufficient both to prevent any stoppage of the beds by the forming of ice and also to maintain the necessary activity of the bacteria, even in the coldest weather. On no occasion had any difficulty been experienced in working the beds during frost. In order to obtain some reliable data as regarded the capacity of the beds, a 6-in. Siemen's patent water-meter was fixed on the outlets to the beds at various dates during the experiments, in order to ascertain the quantity of water dealt with by the beds. The percentage of loss on the high-level coarse bed had been 36·83 per cent. and 43·77 per cent.; on the low-level coarse bed it had been 43·00 per cent., 43·13 per cent., and 53·14 per cent; and on the fine bed 25·92 per cent., 31·36 per cent., and 44·12 per cent. He was of opinion that the detritus tanks provided for in the new scheme would improve the capacity of the beds. The experiments showed that the sewage of West Bromwich could be successfully purified by the bacterial process at all seasons of the year, and that the final effluent from the fine-grained bed on the low level was sufficiently pure to discharge into the stream without undergoing subsequent land treatment. In November, 1900, the author reported on the result of the year's working of the experimental beds, and recommended the carrying out of the whole scheme at an estimated cost of 19,000*l.* The scheme was adopted.

In West Bromwich there were some old blast furnace slag mounds, which were being worked for ballast purposes, &c., and as the slag could be obtained very cheaply, graded to any size, there would be considerable economy from its use as a filling material. The beds were to be filled with the blast furnace slag ⅛ in. to 2 in. for the coarse beds, and from $\frac{1}{16}$ in. to ⅛ in. for the fine beds. In 1898 the Corporation obtained a Provisional Order for the establishment of an electric lighting undertaking. A Committee was appointed, and, after they had visited several installations, two engineers were requested to submit reports and schemes for their consideration, and in due course Mr. Robert C. Quin, M.I.Mech.E., M.I.E.E., was appointed Consulting Engineer. The compulsory area was the main street from the works to Roebuck-street, a distance of 1¾ miles, with several short streets adjoining the Town Hall. The system of supply adopted was that known as the continuous current three-wire system, with an electric pressure of 460 volts between the outer conductors, each dynamo having a series winding in addition to its shunt winding, so as to enable it to develope electric pressure up to 560 volts for power purposes. The tramways in West Bromwich were constructed in 1882, and formed part of the tramway undertaking owned and worked by the South Staffordshire Co., Ltd. The Corporation purchased and paid for the whole of the tramways 38,038*l.* 15*s.* After the purchase had been completed, the Corporation instructed the author and Mr. Quin, consulting engineer, to prepare the necessary plans and specifications for the reconstruction and electrical equipment of the various lines. In due course these were submitted to the Council and approved by them, and as part of the agreement was that the lessee company

Bardic Chair.



Bardic Crown.

Prizes Given at the National Eisteddfod.

should approve of the scheme, they were submitted for their approval, and an arrangement was arrived at between the company and the Corporation for the work to be carried out at a cost not exceeding 100,000*l*. Contracts were then entered into, and the works are now in hand. An experiment had been made with blue brick paving for carriage-ways. The paving afforded a good foothold for horses, and was clean, but in the opinion of the author the bricks were not at present made suitable for roads of very heavy traffic, and the cost, as compared with granite sett paving, was against its adoption in large quantities.

In the discussion which followed,

Mr. J. Price, Birmingham, said he noticed the Corporation had sustained a loss on the electric lighting. After the articles which had appeared in the *Times*, he might be permitted to say that was a question of policy for the members of the Corporation, and not for their officers. If they charged too low a price, the consumers were receiving a subsidy at the expense of the general body of ratepayers.

Mr. J. T. Eayers, Birmingham, remarked that those who did not live in mining districts had no idea of the difficulties to be overcome in the construction of sewers in such districts. They often found a sewer suddenly collapse or drop 14 ft. or 15 ft.

Mr. J. Lemon, Southampton, was of opinion that the Corporation made a huge mistake when they reduced the price of the electric light from 6d. to 4½d. per unit. They were playing into the hands of the opponents of municipal trading by lowering the price, because the effect of it was to throw a deficit upon the rates, which was precisely what the *Times* said they did. All municipal undertakings should be carried out on commercial lines only.

Mr. A. H. Campbell, East Ham, regarded the working expenses of the bacterial scheme as exceedingly moderate.

Mr. Lacey, Oswestry, remarked that information which he had been collecting and tabulating showed that great difficulty was being experienced by the setting up and decreased capacity of septic tanks.

Mr. Smith, Kettering, Mr. Pickering, Nuneaton, Mr. Dickinson, Thame, and others took part in the discussion.

Visits were made during the day to the new Art school, the baths, the electric light works, and the sewage disposal works.

The Mayor entertained the members to luncheon, and Mrs. Greatorex entertained them to tea.

PRIZES AT THE NATIONAL EISTEDDFOD.

At the National Eisteddfod held in Wales annually it is the custom to present a chair and a crown to the two successful bards. The designs in previous Eisteddfoddi have been of the poorest description. In connexion with the Eisteddfod held this month (September) in Bangor the Executive Committee have ventured to strike out a new line.

The Bardic Chair, here illustrated, was designed and made by Mr. Robt. Hilton. The chair is of oak, wax polished, dull. The ornaments and finials are of copper and translucent enamel. The back of the seat is of cow-hide, fastened with copper studs. The rail in front contains a bronzed copper panel of a dragon. The symbolism is Druidical Celtic. On the back is the cauldron of Ceridwen, and, in connexion with it, the oak and mistletoe are used. On the finials are two eagles.

The Bardic crown has been designed and made in beaten copper by Mr. R. Ll. B. Rathbone. It is formed of eight rectangular panels, in which are designs of interlaced Celtic ornament in repoussé. The panels are hinged together, and the four principal ones are connected at the top by four shaped straps, which meet together under a boss and are ornamented with a conventional treatment of bay leaves and berries.

All the medals given at the Eisteddfod have been made from the design of Mr. Goscombe John, A.R.A.

In connexion with the Arts Competitions, Mr. Frank Brangwyn has kindly given his services as chief adjudicator.

Harold Hughes.

COMPETITIONS.

Hospital for Consumption, Liverpool.—The Committee of the Liverpool Hospital for Consumption and Diseases of the Chest recently invited three firms of local architects to submit plans for rearranging and partly rebuilding the hospital. The assessor, Mr. Henry Hartley, F.R.I.B.A., awarded the first premium to Messrs. Grayson & Ould. The Committee have adopted the award, and have instructed Messrs. Grayson & Ould to prepare working drawings. The hospital, which is worked in connexion with the branch in Delamere Forest, Cheshire, will provide accommodation for thirty patients, fifteen of each sex. The existing out-patients' department will not be interfered with, and part of the old hospital buildings are to be converted into an administrative block.

ARCHÆOLOGICAL SOCIETIES.

Essex Archæological Society.—A quarterly meeting and excursion of the Essex Archæological Society was held recently, when the members paid a visit to Mount Bures, Lamarsh, Alphamstone, and Pebmarsh, making Bures St. Mary their centre. Most of the visitors reached Bures shortly before noon, and at twelve o'clock were conducted to Mount Bures Church, which was duly inspected. The church, however, has been so much altered that it has lost its distinctive charm, although it still retains sufficient traces of the original construction to indicate its Norman origin, in various small windows of characteristic style. The party then proceeded to inspect the High Mount—all that is left of the Castle of the Sackvilles. Here a short paper was read by Mr. J. C. Gould, of Loughton, who, with Mr. F. Chancellor (Mayor of Chelmsford), gave much interesting and erudite information to the party. An adjournment was made to the Eight Bells Hotel at Bures St. Mary, where luncheon was had. During the proceedings Mr. Chancellor proposed that the Society should hold a meeting on December 12 to celebrate its fiftieth anniversary, the idea being warmly received. Mr. Gould

read another short paper, drawing attention to the fact that they were upon the dividing line between the ancient kingdoms of the East Saxons and the East Anglians. The party then took to the road, the next place visited being Lamarsh, where the church was shown by the rector, the Rev. A. D. Schreiber. He stated that the church, of which the oldest date known was 1555, was dedicated to the Holy Innocents, and was said to date from 1100; it was restored in 1868 or 1869. It was chiefly remarkable for its round tower which was probably constructed in that form, as the only building material readily accessible was flint-rubble, which did not admit of square corners. It was of the Early English period, and had been surmounted by a modern Flemish spire. The original tower arch was small, and was removed at the restoration of the church, a larger one being substituted by the architect, Sir Arthur Blomfield. It contained one bell by Henry Pleasant, bell founder, Sudbury, dated 1693. In 1849, during some excavation, many fossils were found, the bones of a mammoth being discovered. Mr. Chancellor made some supplementary remarks. He considered the tower to be Late Norman. It was considered that these round towers were very old, and in fact some of them had been attributed to the Danes, but he did not think there was any evidence to prove that. On the contrary, when there was any architectural feature about them it was usually of the Norman period. He thought it was a great pity that Sir Arthur Bloomfield altered the old arch. They had done the same thing at Mount Bures, and absolutely altered the character of the church. Alphamstone, which was the next church visited, was found in the hands of the masons. Mr. Chancellor declared the edifice to be of the Early Decorated period, and made some interesting comments. Mr. Schreiber gave a brief account of the church, which, he said, was quite unrestored, and dated to 1218. The ancient dedication had not been ascertained. The Rector, the Rev. W. Earee, stated that he had been told at one time a great quantity of stained glass belonging to the church was buried, and a good deal of it was now in the windows of Middleton Rectory. Mr. Chancellor also said he had no doubt the church was built in the early part of the twelfth century. The last visit of the day was paid to Pebmarsh Church. Mr. Chancellor termed it an exceedingly fine specimen of a Decorated church, being entirely of the Decorated period. The chief feature of the church was its brass, which was considered one of the finest brasses they had in Essex.—*East Anglian Times.*

Illustrations.

ST. ANDREW'S PRESBYTERIAN CHURCH, BLACKROCK, CO. DUBLIN.

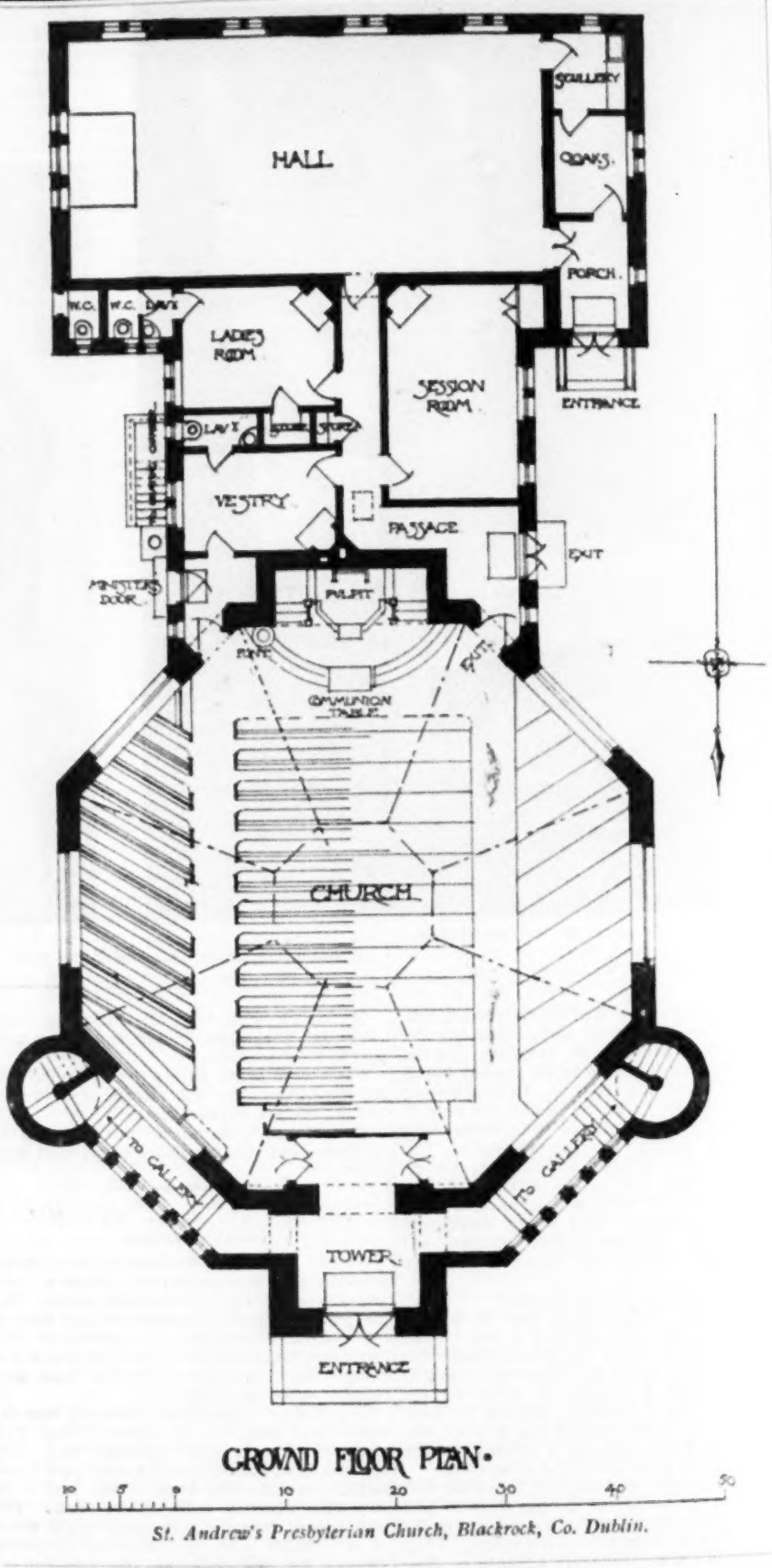
THIS church is built on the south side of Mount Merrion-avenue, Blackrock, and placed 30 ft. back from the frontage line so as not to interfere with the trees on the site.

The church is an octagon, 50 ft. in diameter, covered by a cupola, with a lantern at the apex. The tower, 80 ft. high, is placed in the side of the octagon next Mount Merrion-avenue, and the base forms a porch giving access to the building. On each side of the porch are passages leading to turret staircases to gallery. The organ will be placed in the tower at the gallery level. A hall and retiring-rooms are arranged at the rear. Seating accommodation is provided in the area for 300, and when the gallery is erected 100 more seats will be available.

A free adaptation of Romanesque has been employed for the general design. The walls are built of local hammer-dressed grey granite with Portland stone dressings. The main roof is constructed of steel and covered with Killaloo slates, and the dome of lantern with copper. Over the main entrance is a hammered copper panel bearing the symbol of the Irish Presbyterian Church. The interior and cupola are finished in plaster, and the whole of the internal woodwork stained green.

The cost of the building, exclusive of the hall, which is not yet built, was 4,400*l.*

The main building was executed by Mr. Patrick Caulfield, of Booterstown, and the rooms at the rear by Mr. George Langley, of Dublin; the heating by Messrs. Musgrave & Co., of Belfast; the copper panel over entrance door by Mr. W. B. Reynolds, of London; and the gas fittings by Messrs. Curtis & Son, of Dublin. Mr. Daniel Devlin acted as clerk of works, and Messrs. Murray and Forrester, of Westminster, were the architects.



St. Andrew's Presbyterian Church, Blackrock, Co. Dublin.

TWO STREET FRONTS, PARIS.

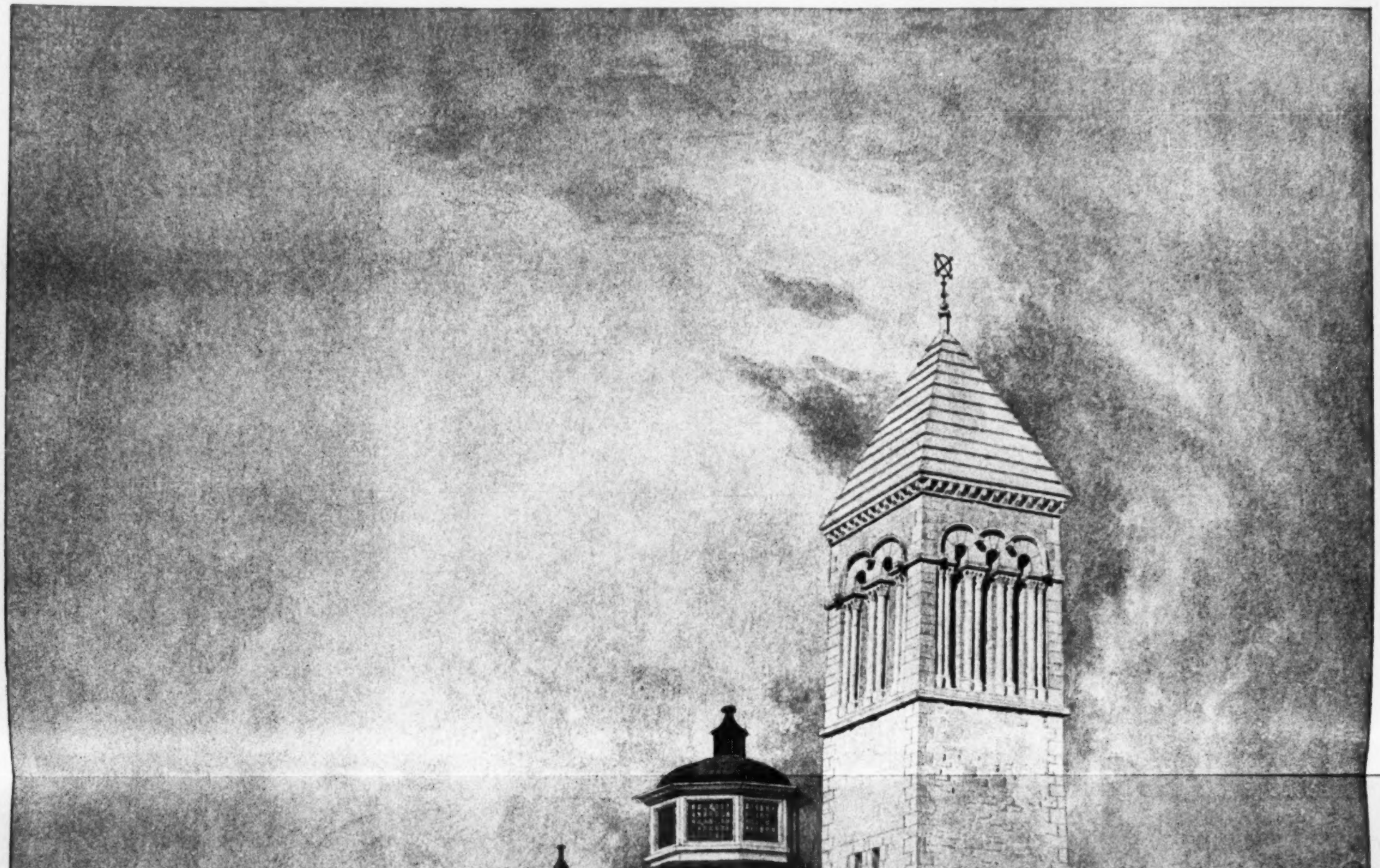
THE two houses shown here are from photographs of street fronts in Paris, erected within a recent period; one in the Rue de la Faisanderie, of which M. Doumoulin is the architect; the other, in Rue la Boétie, designed by M. Lobrot.

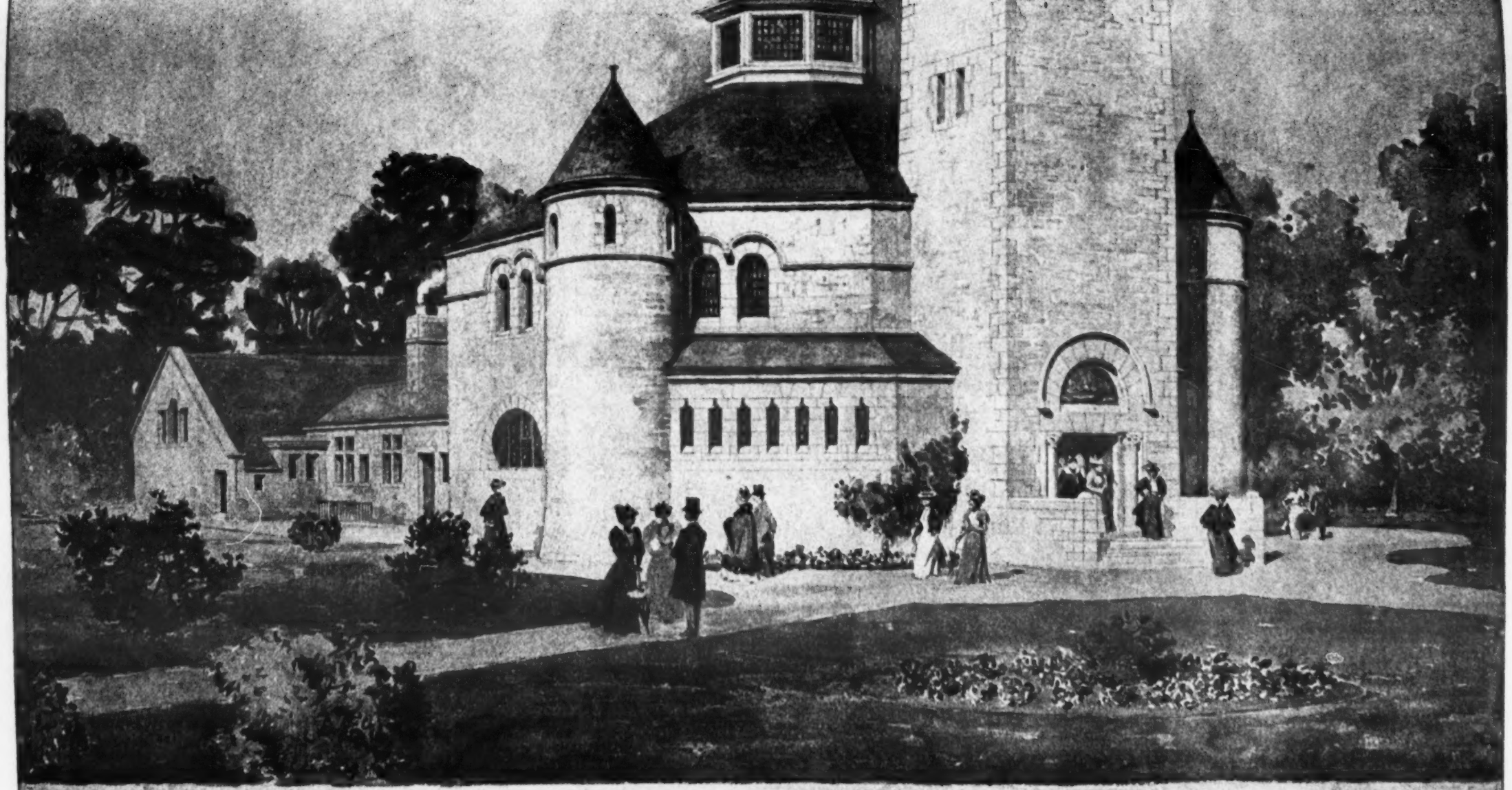
Some further reference is made to them in the first article in this issue.

PROPOSED RESIDENCE IN SUSSEX.

THIS residence, externally, was designed to be built in red brick facings with Portland stone dressings, the whole of the bays to front and back elevations to be in stone, the window openings to be of iron casements and heavily-leaded glazings. The roofs were to be covered in with green Westmoreland slates. Internally, the woodwork was to be mainly fumigated oak, with high oak panelling in large hall and dining-room, with oak beams exposed on ceilings. The chimney-pieces were to be in carved stone, and, generally speaking, the details were to be treated in a broad yet simple manner, with a minimum of moulded surfaces.

The design was exhibited at the Royal Academy in 1900, and was prepared as a com-





St. ANDREWS · PRESBYTERIAN · CHURCH · BLACKROCK · COUNTY-DUBLIN · Murray & Forrester · Architects ·

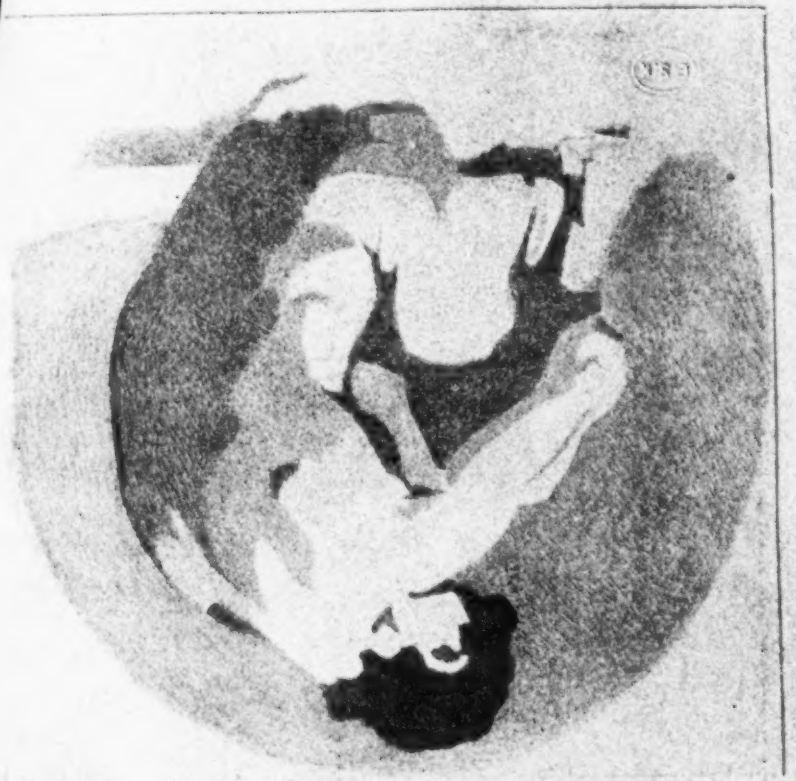
INK PHOTO SPRAGUE & CO LTD 4 & 5 EAST HARDING STREET FETTER LANE E.C.

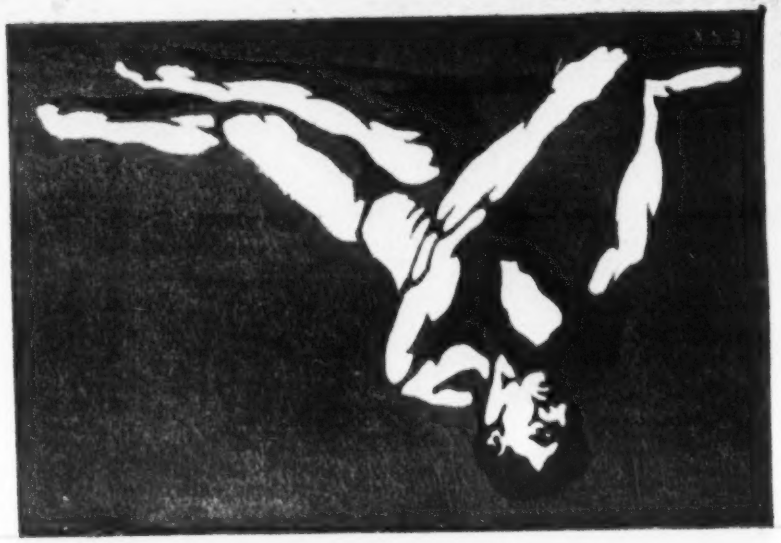
HOUSE, RUE DE LA FAISANDERIE, PARIS.—M. DOURGUIN, ARCHITECT

HOUSE, RUE LA BOÉTIE, PARIS.—M. LEMAIT, ARCHITECT

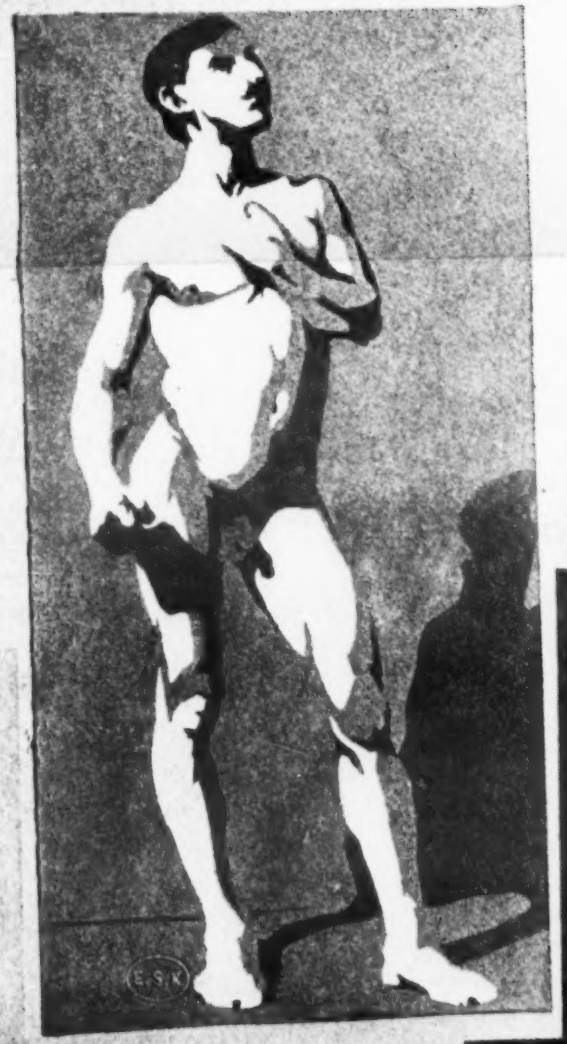
FOR A MANTLING
SUBMITTED
THIS YEAR

FOR APPLICATION
OF TWO STENCIL
SEE DESIGN





DECORATIVE STUDIES IN ONE AND TWO PLATE STENCILS



CUT DIRECT FROM THE LIFE MODEL BY GILBERT ROGERS

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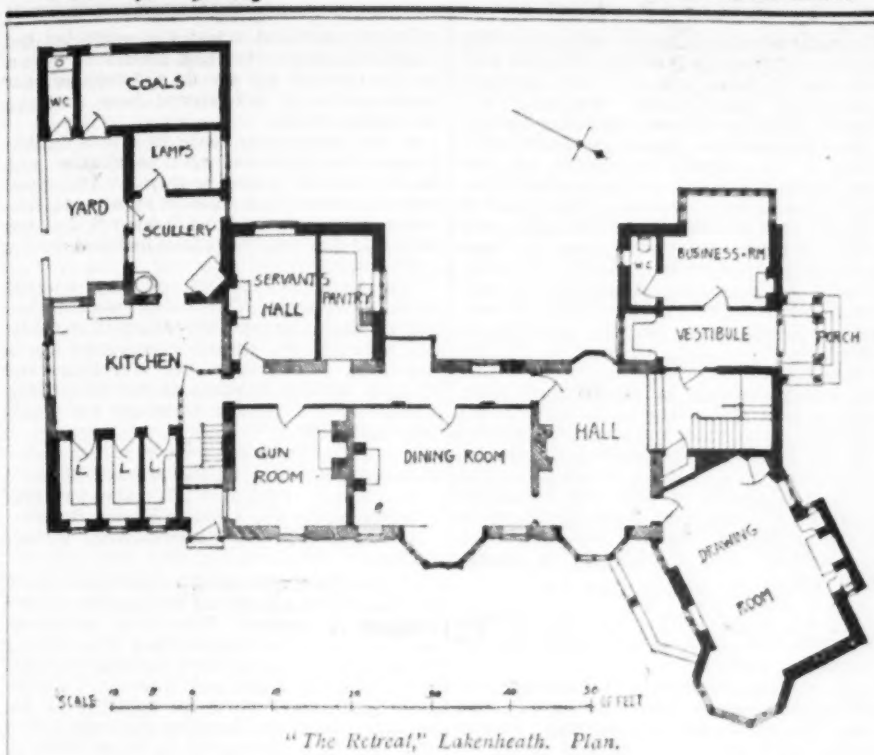
THE BUILDER, OCTOBER 4, 1902.

INK PHOTO SYRACUSE A.C. LTD. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

"THE RETREAT," LAKENHEATH, SUFFOLK. ENTRANCE FRONT.—Mr. A. N. Prentice, A.R.I.B.A., Architect.



"The Retreat," Lakenheath. Plan.

mission to be carried out, but owing to circumstances the scheme had to be abandoned.

FRANK FOSTER.

"THE RETREAT," LAKENHEATH, SUFFOLK.

THIS building was formerly a Suffolk farmhouse built of flint with brick dressings and reed-thatched roof. The plan shows the extent of the alterations which have recently been carried out for the owner, who now uses the house as a shooting box.

The drawing-room was placed on the angle in order to obtain a southern aspect. The house has all been re-thatched, and local flints and bricks were used in the new portions. The hall and dining-room were panelled in Austrian oak.

Mr. Cowell, of Soham, was the builder.

A. N. PRENTICE.

FIGURE STUDIES IN STENCIL.

THIS is a reproduction of a series of figure studies produced in rather an unusual manner, by stencils cut from drawings made from the model. The artist, Mr. Gilbert Rogers, a student in the Mount-street School of Art at Liverpool, obtained for them a bronze medal in this year's national competition under the Science and Art Department.

The following is Mr. Rogers's note on his method of procedure:—

"There is not much to explain; everybody is familiar with the process of stencilling. I may say that in each case I used two plates, one for the masses of light and the other for the darks, the coloured paper on which the prints were made forming the half-tones. Sometimes I made a variation by using the colour of the paper for the lights, and the two stencil plates for the half and dark tones respectively. The same result was effected as in the case of the first method.

I believe the principal element of novelty in my stencils is that they were cut in the presence of the model, so that they may be described as stencils from life. My method was to make a sketch from the model before me and immediately cut it into a stencil and take a proof, using transparent water colour, or in some cases a faint body colour. The second plate was then cut in the same way and the proof at once finished."

WAUCHOPE MEMORIAL MONUMENT, YETHOLM.—A monument to the memory of the late Major-General Wauchope, which has been erected on the village green at Town Yetholm (situated on the northern base of the Cheviot Hills), was unveiled on the 24th ult. The monument is in the form of an obelisk of Aberdeen granite, standing about 19 ft. high, and has been erected by Messrs. Waldie & Sons, Edinburgh, from the design of Mr. T. P. Marwick, architect, of that city.

Books.

The Apartments of the House: Their Arrangement, Furnishing, and Decoration. By JOSEPH CROUCH and EDMUND BUTLER, Architects. London: At the Sign of the Unicorn. MDCCCC.

IT is difficult to imagine for whose benefit (other than the authors') this remarkable book was prepared. It is hard to suppose any one particularly moved by the sententiously uttered sentiments with which the work abounds—*e.g.*, "a house . . . . is the temple of the home-spirit"; it is incumbent upon us to make "the shrine ever more and more adequately expressive," "the stones and beams become precious to us as the silent witnesses of our most sacred joys and sorrows," &c., &c. Each chapter, be it observed, is prefaced with a few sentiments culled from the works of the late Mr. Ruskin and others, as if to give a species of Biblical sanction to the theories—and, may we add, the designs—of Messrs. Crouch and Butler; and, by the way, it argues a want of clemency in the natures of the latter gentlemen to have dug up a phrase of Ruskin's which his best friends would surely wish to be forgotten. "Portable art," we read, "independent of all place, is for the most part ignoble art." Now, in view of the fact that for the work of Turner and other painters of easel pictures Ruskin for many years of his life blew his second-best trumpet, the reappearance in print of this dictum would seem particularly unfortunate.

A few interior views of what the authors call "old work," such, for instance, as the kitchen at St. Mary's, Coventry (from which few conclusions apposite to theories of modern comfort can be drawn), are to be found scattered up and down the book, but the substance of it consists in a series of designs for modern apartments of all kinds, and at the outset it cannot but be regarded as an extraordinary circumstance that no authorship is assigned to the designs in question. It is, perhaps, superfluous to attempt any criticism of the merits of these designs, but in passing it may be observed that the remarkable drawing described as "a suggestion for a den or a smoking-room," follows but ill upon remarks as to "Simplicity and Appropriateness" being the "watchwords of the new artistic movement." We read on page 26 that this same new school is "the enemy of all meaningless ornament and fussy effects of mere applied decoration." Fig. 27, however, in spite of this very inspiriting announcement, exhibits a somewhat prodigal use of the Ace of Hearts, not merely as the basis, but as the substance of the design. This charming form, this tender emblem, appears not only on the wall, on the panes of glass filling up the slits which serve for windows, but on every article of furniture in the room. Who, we ask again, is the artist responsible for these, and we may add, for the other delicate efforts revealed to us in this work, so neatly printed and bound?

Of the total number of illustrations, excluding a few small wash drawings of furniture, &c., twenty-five interior views of rooms in various houses are reproduced. No clue is afforded as to whence these charming pictures are obtained. Some few are from photographs, but by far the larger number are perspective drawings, by no means well executed. Each picture is accompanied by an attractively-worded description. In one place a suggestive plan for "a cosy dining-room" is inserted, and we naturally feel that if all these drawings are the work of living genius, it is cruel to withhold names from a clamorous and enthusiastic public.

But when we reach the appendices and note that the authors considered it "desirable to append one set of plans and elevations;" when we read that "the house illustrated is within the means of the man in the hansom;" that "the building contract should not exceed 1,500*l.*, while another 500*l.* or 2,000*l.* in all would furnish the place on the lines suggested in the book," it only remains for us to draw comparisons between this work and the literary productions accompanying patent medicines of American manufacture.

Speaking seriously, this work can bring little credit to the authors, either in the profession or out of it.

Progressive Design for Students. By JAMES WARD. London: Chapman & Hall. 1902.

FOR teachers, Mr. Ward's new book will be found very valuable. There exists no little difference of opinion as to the method of instilling the principles of design into the mind of the young student. Many begin by calling attention to simple geometric devices, whereby given spaces may be pleasingly filled. Mr. Ward chooses to leave the study of strictly geometrical forms to the end of his course, and to put before his students simple leaves and flowers as the "elements" of design. This appears to us to be by far the better method.

Mr. Ward is a man of great experience in this field of study, and all that he has to say is worth reading. Here is a passage in his introduction which might indeed be taken to heart by architectural students and teachers:—

"The study of classical ornament should have attention concurrently with the drawing and designing from examples of plants and natural forms, not so much as a means of learning to draw, but for the purpose of enabling the student to learn the principles and construction on which the composition of good ornament is based. Too much copying of the acanthus foliage in art is dry food for the young student, and is apt to create in him a distaste for his work and to dull his imaginative powers. Generally speaking, the study of historic ornament might safely be left until the student has learnt to draw from objects and natural forms. . . ."

Altogether a well-written book, admirably illustrated and carefully printed.

Pattern Drawing and Design. By JOHN CARROLL. London: Burns & Oates, Ltd. 1902.

MR. CARROLL is well known as a teacher and writer on matters of art education. The little book before us (one of a series) is a good example of his careful and systematic efforts to create reliable text-books for class use.

Report of the Proceedings and Abstracts of the Papers read: International Engineering Congress (Glasgow), 1901. Glasgow: William Asher. 1902.

ALTHOUGH appearing somewhat late in the day, the volume recording the proceedings of the Glasgow Engineering Congress will be welcomed, for it presents the views of eminent men upon many great engineering problems of the time. As about one hundred papers were read and discussed at the meetings, it is clear that we cannot attempt, in this brief notice, to do more than to refer to a few of the subjects raised. In Section I., a question of extreme interest: "The Economy of Electricity as a Motive Power," was discussed by Professor Carus-Wilson, and from the particulars furnished it appears that the adoption of electricity would be particularly advantageous on branch or cross-country railways which at present rarely do

more than cover working expenses. We are pleased to call attention to a paper on "The Proposed Tunnel between Scotland and Ireland," by the veteran James Barton, whose membership of the Institution of Civil Engineers dates from the year 1853, and who is still on the Council of that body. Section II., dealing with waterways and maritime works, is distinguished by the contribution of papers from American, Continental, and British engineers, the works considered being of the highest importance to the world at large. In the mechanical engineering section, the steam turbine, the most notable invention of its class since the age of Watt and Stephenson, was considered in a paper by the Hon. C. A. Parsons; but it should be remarked that the results recorded have since been considerably improved upon. "The use of highly-superheated steam" is another subject raised in the same section, and it is one that is of considerable interest to all steam-users. Among other contributions to which we direct the special attention of our readers are the following, the titles of which we have abbreviated:—"Power from Blast-Furnace Gases," describing a system of power production that will certainly add to the industrial strength of the country; "Internal Strains of Iron and Steel," a subject of much scientific and practical interest; "Brick-Making," including references to the most modern methods and machinery; and "Mine Ventilation," a paper which may be commended to the engineers of low-level electric railways. Finally, we may say that unabridged proceedings of the various sections are to be obtained from different publishers, this being a facility that will doubtless be appreciated by many desiring more information than is given in the abstracts now issued.

Designing Ironwork. Second Series: Part III. Cisterns and Tanks. By Henry Adams, M.Inst.C.E., M.I.Mech.E., &c. Published by the Author. London. 1902.

In the present instalment of the series now being written by Professor Adams on the design of ironwork, we have an extremely useful and practical pamphlet, which every architect ought to possess. There is no particular difficulty in designing a water tank, for the mechanical principles involved are of the most familiar and ordinary kind, but acquaintance with various practical details of construction is very desirable. So far as we are aware, no details of the kind are presented in any of the numerous text-books published in this country. We do not think it is too much to say that most architects, and perhaps engineers, are apt to leave the design of cast iron tanks very much in the hands of firms who are known as reliable makers of such structures. This cannot be looked upon as an altogether satisfactory position, and the pamphlet now issued by Professor Adams gives, in a handy form, just those particulars that have long been wanted. After some notes on water-pressure, the sizes of supply-pipes, and matters relating to cisterns and tanks in general, some simple rules are stated for calculating the distribution of pressure in a tank and the thickness of plates. All necessary details, such as the stiffening of plates, the form of joints, the dimensions of bolts, ties, and flanges, are discussed. Tank supports, and other auxiliaries, also receive attention, and the book concludes with calculations for a tank designed to hold 15,000 gallons. Two plates, including seventy-eight detail drawings illustrating the letterpress, add very much to the value of this issue.

Modern Iron Foundry Practice. Part I. By Geo. R. Bale, A.M.Inst.C.E. London: The Technical Publishing Co. 1902.

In the volume before us we find an excellent description of the equipment and materials used and ordinary processes followed in the foundry. While very few of our readers may find it necessary to become experts in foundry practice, it is very desirable that all should have adequate general knowledge on the subject, and those who are not already so equipped will find Mr. Bale's treatise of considerable use. Of the first eight chapters, dealing with the customary requisites of an ordinary foundry, that on "the cupola and its charge," is one of the most useful, as it contains serviceable data as to the effect of various constituents on the quality of the metal, and consequently on its suitability for different purposes. The remainder of the book is chiefly occupied with details relative to the three kinds of moulding in general use, "green sand," "dry sand," and "loam" moulding. The distinguishing features of these methods are clearly explained, and a perusal of the chapters in question will certainly repay the reader whose profession or business necessitates the design and use of castings. The references made to the manufacture of pipes and the chapters on loam moulding are particularly worthy of notice, the latter for the reason that acquaintance with the method followed in the production of loam castings will often save the delay and expense involved in the making of patterns for odd castings. The concluding chapter on "malleable castings" should be of assistance to the designer, as it gives data as to the physical qualities of the material and some observations as to the preparation of patterns and moulds for malleable iron. Finally, we may say that the work is lucidly written and admirably illustrated, although some of the blocks, reproduced from the catalogues of various makers, are decidedly inappropriate in a purely scientific book.

Electrical Installations. Vol. 2. Rankin Kennedy, C.E. The Caxton Publishing Co. London. 1902.

In this volume the author first describes standard instruments for electrical testing, then numerous transforming and converting devices are illustrated and explained, and finally he gives a fairly full description of electrical installation accessories. The book is a running commentary on current electrical practice, and the author in many places gives his own opinion in such a way that the student will probably be misled into thinking that it is the generally accepted opinion of engineers. There are too many illustrations; it would be a great improvement to omit half of them and fill the space saved with further description of the remainder.

On page 1 an Ayrton & Mather's galvanometer is described. We are told that the "fine-wire coil" is suspended by a *silk fibre*. The student will naturally wonder how the current can get into the coil of this form of d'Arsonval (not d'Arsonville) instrument. As a matter of fact, the coil is suspended by a phosphor bronze strip.

The reader gets the impression from Chapter I. that volts and amperes can be measured with ordinary care to 0·1 per cent., and that ohms can be measured by the best instruments to 0·01 per cent. Now we know of no standard voltmeter or ammeter that can be trusted to read correctly to an accuracy of one in a thousand. A Kelvin electrostatic voltmeter, for example, for use on a 100-volt circuit will give readings differing by 0·2 or 0·3 of a volt, depending on which terminal is made positive. Standard voltmeters have to be continually calibrated by comparing them with a Clark cell, but even when calibrated for direct pressures, how are we to know the correction to be made for alternating pressures?

Mr. Kennedy has a very high opinion of the value of watt-hour meters for testing batteries. The results obtained by them are "of far more value than the results of tests and reports made by any testing institutions." The assumption is made somewhat hastily that testing institutions do not use watt-hour meters for testing batteries. We can assure him that this method is often used both by institutions and consulting engineers. In the latter case, however, the mistake is often made of neglecting to standardise the "accurate" watt-hour meter, and so the errors in the maker's calibration are superposed on the experimental errors and on the errors introduced by neglecting the effect of temperature, variation of load, &c., and so the final result is only a rough indication, and not a measurement at all.

The chapter on transformers and converters is uninteresting, and the attempt made to teach the student the principles underlying their design is not successful.

On page 99 a sketch is shown of the connexion between the consumer's wiring and the supply company's mains. A double-pole switch is shown next the mains, then a double-pole fuse, and finally the meter. With this arrangement it will be obvious to those with a little electrical knowledge that it would easily be possible for a dishonest consumer to get unlimited energy for nothing. The author says some hard things about municipal control, and the "harassing rules and regulations" to which the electrical industry is subjected, but if electricians want to place meters as shown in figs. 110 and 120 we do not wonder that municipalities in self-defence have to make "harassing" rules.

In the last chapter there is a considerable amount of information useful to wiremen and those interested in electric wiring. There are, however, many illustrations of resistances, &c., which are crude and old-fashioned, and we think that they must have been included merely to fill space.

The book is, in fact, of very unequal merit throughout. The author often makes spirited attacks on ordinarily accepted methods, and although the expert occasionally learns something from them, yet sometimes the strongly worded conclusions are in glaring contrast to the slender premisses on which they are based.

Handbook of the London Master Builders' Association. Edited by J. William Ritchie. Published by the London Master Builders' Association, 31-32, Bedford-street, Strand. 1902.

This handbook represents a new departure on the part of the officials of the London Master Builders' Association. The Editor generally, we think, can be congratulated upon having compiled a very useful work for those engaged in the building trade, and although it appeals more particularly to those engaged in the practical part of this trade, at the same time it will also be found useful by those taking up the professional side. In fact, the catholicity of the selection of the Editor is a very striking feature. A perusal of the "General Contents," on pp. 19-21, will give one an idea of the quaint variety of the subjects touched upon—almost too great, one would think—as the work would suffer little if almost the whole of Part IV. were eliminated, while it is difficult to see the connexion of "Marriage with a Deceased Wife's Sister" with the building trade in general or with the other items of Part III. in particular. A few reports of cases bearing upon the reading of the Building Act would be far more to the point.

A very useful feature is Part V., being the by-laws, rules, and regulations of the London Water Companies, with a map showing the areas dealt with by the various companies. This "part" has, however, some curious introductions, viz:—Notes on "Leasehold Enfranchisement," "Arbitration — The Hague Court," and "Admiralty Works Department." The latter, while being in keeping with the intention of the book, has no connexion with this particular "part." The other items are quite foreign to the work.

The summary of working rules (pp. 59-65) are useful, but we think the rate of wages might be given in addition to the note of advances on p. 60.

There are various notes and tables throughout the work that add to the value. It would, however, be advisable to arrange these in some order.

Taking the work as a whole there is much to be commended, and we note with pleasure the absence of debateable opinions upon such questions as may affect the trade, *e.g.*, in the chapter on "Municipal Trading." With the elimination of some of the items and a careful rearrangement, this book will doubtless take its place in years to come as a most useful work of reference for all those engaged in the building trade in London.

TRADE CATALOGUES.

Messrs. J. H. Sankey & Son send us an illustration sheet of "Sankey's Sink Trap," which is made of glazed stoneware, and requires no plumbing in fixing. It has an efficient water seal, and seems altogether a good article.

The Permanent Decorative Glass Co., whose glass wall-tiling we noticed two or three months ago (under the heading "Florite Opal Tiling"), send us a book of designs for decorative wall-linings in this material. We had before remarked that the process would lend itself to decorative design as well as to merely imitative work. Some of the designs are very good, and, as far as can be judged from their appearance on paper, would be effective in execution in the material proposed.

We have received from W. Gyllich, of St. Olave's House, Lloyds-avenue, E.C., an illustrated pamphlet describing a new automatic lift manufactured by the Titan Co., of Copen-

hagen. The motive power is electricity, and it is immaterial whether the supply is direct or alternating. To call the lift, all that is necessary is to press a button outside the landing door; this starts the motor, and the lift moves and stops opposite the door, which can only then be opened. On entering we press a button inside corresponding to the floor to which we want to go; the door then shuts automatically and the lift moves up or down, as the case may be. All the doors in the landings and in the cage are fitted with electrical and mechanical safety locks, and in addition there is a very complete list of safety brakes and appliances. It is claimed that this lift can be operated with the greatest ease and safety even by a child, and as the power consumed is in direct proportion to the work it has to do it is economical. Several have been in operation for years. The Titan Co. also make smaller lifts on the same principle for goods, and these ought to prove very useful in large warehouses.

Messrs. John Wright & Co. (Birmingham) send us a small illustrated catalogue of their "Eureka" gas fires and gas-heating stoves, of which there are a great many forms shown in small engravings, differing apparently rather in appearance than in principle. It is claimed for them that every hindrance to perfect combustion has been avoided, and the fire is therefore heated bright red to the top. If some of the cast-iron ornament of these grates were done away with, and some simpler patterns by good designers procured, they might be made much more attractive in outward appearance, without losing any of their practical qualities.

The Sun Fan Co. (Bradford) send us an illustrated catalogue of their ventilating fans, which are made entirely of wrought iron to prevent breakage. The designs of the blades are modified for the work to be done; and where there is a high resistance to be overcome, the Company recommend the use of their "double-effect" fan, which is equally efficient in either direction, and is used where it is needed to blow or exhaust alternately through ducts, as in refrigeration work, or to force or exhaust air for drying purposes through heaters, and large masses of grain, wool, rags, &c., &c. The efficiency at moderate speeds especially is said to be very high indeed. For working in steams, acids, &c., fans with copper blades can be supplied. Some tables of speeds, volumes and powers are added. A second catalogue, in the same form, gives particulars of electrically driven fans.

Messrs. William Morris & Co. (of Fulham-road, Chelsea) send us two catalogues illustrating the work they are doing in designs for leaded lights. This is the system which has become rather a favourite one of late, of making the leading the design, but we have not seen it done in so artistic and picturesque a manner as is shown in this catalogue. One or two of the designs are perhaps a little "twisty" and eccentric; but in the main they are sufficiently architectural in character, and show a great deal of fancy and play of line. We should prefer that the firm would give the name of the actual designer, who certainly merits recognition.

Messrs. F. W. Reynolds & Co. send us their catalogue of hand-power wood-working machinery and lifting and hoisting appliances, in which many types of useful machines are illustrated and described. The "Queen" hand-power circular and band-sawing machine ought to be appreciated in small workshops where the amount of work done is not sufficient to justify the purchase of separate machines. A still more inexpensive appliance is the "Princess" band-saw apparatus, which can be readily attached to any ordinary bench. Band-saw machines are shown in various sizes suitable for different classes of work, and amongst mortising machines we may mention the "Samson" as one of the most powerful appliances of its type, capable of mortising from ¾ in. to 1¼ in. wide. The stroke of the machine is 6 in., and it will take in timber up to 12 in. by 6 in. Attention may also be directed to the "Southwark" mortising, boring, and core-driving machine, which is fitted with a revolving tool-holder arranged so that the chisel, core-driver, and augur, may be alternately used without the necessity for shifting timber held in the machine until the required work has been finished. Amongst appliances for dealing with paints, we observe an ingenious self-acting painting machine suitable for Venetian blind laths, hoop iron, and similar objects. Hoisting appliances of various familiar types are illustrated, as also are guards for sawing and other wood-working machinery.

Messrs. Jonas Smith & Co. send us their catalogue of sawn timber in stock, with information as to brands, sizes, port of export, and place of stowage in London.

Messrs. Jacobs Bros. (London and Antwerp) send us their monthly list of iron and steel bars, rods, joists, steel wire, nails, &c., now in stock.

Correspondence.

HOW TO SET OUT AN ELLIPTIC ARCH.

The following is a practical way of setting out an ellipse, and it would be well if architects insisted upon having the proper curve when they ask for it. Carpenters and masons fondly imagine that they can make an ellipse by means of a collection of circles (fig. 2), and the writer has heard it whispered that there was once an architect who thought so too, but that was long ago.

The usual method, with two centres and a piece of string is not practical for obvious reasons, but the following method will be found perfectly simple and perfectly accurate (see fig. 1). Set out AC the width of the arch, OB the height. Now take a straight edge QR, the length of half the opening AC, plus the height of the proposed arch, and divide QR at P so that QP=AO, and PR=OB. Make a small nick at P to receive pencil or point. Nail a straight edged lath along AC and another

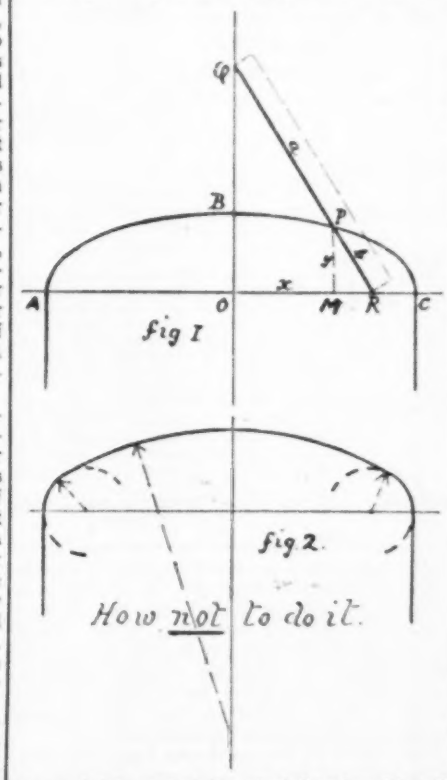


Fig 1

along OBQ, so that the straight edge QR will be able to slide freely between them. Now lay QPR along the line OB, so that P coincides with B. Place a pencil in nick at P and slide R along the lath towards C. The point P will describe the ellipse required (there is only one ellipse which will pass through the three points ABC). Of course the lath along OBQ must be shifted to the other side of the centre line in order to describe the other side of the ellipse.

For those who can receive it, the following is a proof that the curve thus described is a true ellipse:—

Let PQ=a, PR=b. x, and y, the co-ordinates of P. Then by similar triangles

$$\frac{x^2}{a^2}=\frac{OM^2}{QP^2}=\frac{OR^2}{QR^2}$$

$$\frac{y^2}{b^2}=\frac{PM^2}{PR^2}=\frac{QO^2}{QR^2}$$

$$\therefore \frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{QO^2}{QR^2}+\frac{OR^2}{QR^2}=\frac{QO^2+OR^2}{QR^2}=1.$$

i.e. Locus of P is an ellipse.

KNOX & WELLS.

*** Our correspondents' communication is of interest but we do not know that their initial gibes are quite called for. We have met with carpenters and masons who were quite clear as to what an ellipse is; and possibly the architect referred to was intending to draw a three-centred arch, according to the (occasional) practice of his Tudor predecessors. Of course, we quite agree in preferring the true ellipse, as a form.—ED.

RE WANDSWORTH TECHNICAL INSTITUTE.

SIR,—Allow me to draw attention to the unfair criticism on the students' work at the above Institute. One has only to state the conditions under which the competion was held, and the whole of the remarks, so far as the drawings are concerned, fall to the ground.

The drawings exhibited were the work of the students in the Building Construction class, executed at home during the summer vacation, the primary condition of the competition being that the work submitted should be entirely designed and drawn by the competitor, the designs to be worked to a specification, and the cost not to exceed 500*l.* for advanced students, and 1,000*l.* for honours.

Several drawings I had not seen until they hung on the walls of the Institute, and I consider an apology is due not only to the instructor, but also to the students, as to speak of their work as "rubbish," after they have spent many an hour in endeavouring to overcome the difficulties of the first principles of house planning, is most disheartening.

I may add that the student who obtained the first prize is but eighteen years of age and is an apprentice to the carpentry in one of our leading firms, and further, I have taken expert opinion with regard to the designs submitted, and for trade students they consider the drawings do them great credit.

This is my seventh session at the Wandsworth Technical Institute, and if necessary I could produce many old students who would testify to their appreciation, the few elementary principles I have been able to give them on house planning and designing; and personally, after an experience of lecturing to trade students for over twelve years, I consider the reading of plans to be one of the utmost importance to the trade student, and to be able to draw out plans and sections of even a six-roomed house must assist him greatly in following and appreciating designs of some of our best masters,

ERNEST CANNELL,
Lecturer on Building Construction to the Institute.

*** Our critic was under the impression that the drawings were from examples set before the students. As efforts of young students in the building trades they are not so bad, but they do not represent what would pass muster among architectural students, and our correspondent is mistaken if he thinks so.—ED.

The Student's Column.

THE CHEMISTRY OF BUILDING MATERIALS.

14.—COPPER, ZINC, AND BRASS.—THE PROPERTIES OF ALLOYS.

PROPERTIES OF COPPER.—Copper is very malleable and ductile, and is a much better conductor of heat and electricity than any other abundant metal. Silver surpasses it as a conductor either of heat or electricity. The melting point of copper is about 1,100 deg. C., and its specific gravity is about 8·94. Copper is not corroded by dry air, but the joint attack of atmospheric carbon dioxide and moisture converts it into basic copper carbonate, the green compound which is often seen upon the surface of the exposed metal, and which is sometimes called verdigris. The term "verdigris" is, however, more correctly applied to basic acetate of copper.

All soluble salts of copper are poisonous, and copper culinary vessels should therefore be kept scrupulously clean. Copper is almost insoluble in hydrochloric acid, but it dissolves readily in nitric acid or hot concentrated sulphuric acid. When exposed to salt water and air copper becomes more or less coated with copper oxychloride.

Sources of Copper.—Copper is found in the metallic state in many parts of the world, the metal being particularly abundant upon the shores of Lake Superior. The metal is, however, most largely obtained from copper ores, of which the most abundant are the sulphides known as copper pyrites ($CuFeS_2$) and copper glance (Cu_2S), and some complex sulphides of copper, arsenic, and antimony. Less abundant ores are the green hydrated carbonate known as malachite, the blue hydrated carbonate called azurite, a red sub-

oxide termed cuprite, and the black oxide. In the United Kingdom copper ores are found in greatest abundance in Cornwall, from whence they are mostly sent to Swansea to be smelted.

Copper ores usually contain so many impurities that the metallic copper extracted therefrom commonly contains small proportions of several foreign metals, in addition to traces of oxygen, arsenic, and sulphur. The metals most frequently present in commercial copper are antimony, tin, lead, bismuth, nickel, iron, and zinc.

Smelting Copper Ores.—The manufacture of copper from its ores is a complex process, and the methods employed have to be varied to suit the composition of the ores treated. Briefly, the method of obtaining copper from copper pyrites, the most abundant ore, is as follows:—The ore is first roasted to expel some of the sulphur and to convert a portion of the sulphides of copper and iron into oxides. The roasted ore is then smelted with silica or siliceous matter. The silica combines with the oxide of iron to form fusible ferrous silicate, which is removed as slag, and copper sulphide containing less iron sulphide than was present in the original ore is obtained. This partially-purified copper sulphide is known as "coarse metal," and is subsequently ground and roasted to convert the remainder of the iron sulphide into oxide. The roasted coarse metal is again smelted with silica to enable the iron oxide to be removed as slag (ferrous silicate), and a comparatively pure copper sulphide, known as "white metal," or "fine metal," is obtained. The fine metal is then converted into a mixture of oxide and sulphide of copper by being roasted in presence of a current of air. Air is then excluded from the furnace, and the oxide and sulphide of copper react upon one another, and metallic copper and gaseous sulphur dioxide are produced.

In America, the coarse metal is usually run into a Bessemer converter having a siliceous lining, and metallic copper is produced by blowing air through the molten sulphide.

The copper obtained by the foregoing process is very impure, and has to be refined. The bars of copper are remelted in contact with a current of air to expel as far as possible the remaining traces of sulphur and arsenic in the form of gases or vapours, and to oxidise metallic impurities. As some of the copper is also oxidised into cuprous oxide, the presence of which renders the metal brittle, the molten copper is covered with finely-powdered carbon and well stirred with a pole of green wood. The gases escaping from the green wood when plunged into the molten metal reduce the cuprous oxide to metallic copper.

Impurities in Copper.—Lead is frequently added to copper in quantity not exceeding 0·5 per cent. to render it more suitable for rolling. Arsenic is always present in copper, and tends to make it brittle. The proportion of arsenic should not exceed 0·05 per cent. in B.S. (best selected) copper, which is the purest commercial form of the metal, and it should not exceed 0·5 per cent. in copper plates. Bismuth should not exceed 0·05 per cent., for a larger proportion makes the copper excessively brittle. Sulphur is also an objectionable impurity, sometimes present in small proportion in commercial copper. Nickel, cobalt, silver, tin, zinc, and iron are often present, but in such minute proportions that they have little or no effect on the physical properties of the metal.

For electrical purposes the purest commercial copper has to be employed, for even minute proportions of such impurities as arsenic, phosphorus, or iron greatly reduce the conductivity of the metal.

Zinc.—Most of the zinc used in this country comes from Belgium, Silesia, and Poland in the form of flat cakes, and in this form is known in commerce as "spelter."

Properties of Zinc.—Commercial zinc is a brittle, crystalline metal of bluish-white colour. Although brittle when cold, it is malleable while maintained at temperatures between 100 degs. C. and 200 degs. C. At temperatures above 200 degs. C. it again becomes brittle. Zinc is therefore usually rolled at a temperature of about 120 deg. C. The melting point of zinc is 412 degs. C., and at 1,040 degs. C. it boils. Zinc can to a large extent be purified by distillation from metals which do not volatilise at so low a temperature. When strongly heated in the atmosphere zinc burns with a bright greenish flame, and dense white fumes of zinc oxide are formed. Zinc is readily acted upon by most acids and alkalies, even soap having an appreciable effect upon it. It does not alloy with lead to any considerable extent, but readily forms alloys with most other metals. Zinc makes excellent castings, and "French bronzes" consist of zinc casts coloured to represent bronze.

Zinc Ores.—The most abundant ores of zinc are zinc sulphide, also known as zinc blende or "Black Jack," zinc carbonate or calamine, the red oxide, and the silicate ($Zn_2SiO_4H_2O$), known as "Smithsonite." The ore is roasted, then mixed with charcoal and heated in a retort. Zinc distils over and is condensed by being led into water or into any suitable condenser. The metal cadmium, which is sometimes present in combined form in zinc ore, is more volatile than zinc, and is, therefore, sometimes found as an impurity in the zinc obtained by distillation. A certain proportion of lead present in the original zinc ore also distils over and condenses as an impurity in the zinc. The greater portion of the other impurities in the ore remain in the retort.

Impurities in Zinc. — Commercial, zinc usually contains about 98·5 per cent. of zinc and small proportions of lead, iron, arsenic, and tin, while traces of copper and cadmium are also frequently present.

Brass.—Brass is an alloy of copper and zinc. These two metals can be alloyed in any proportion. The following are some of the proportions of the two metals commonly used for the manufacture of different descriptions of brass:—

Variety of Brass.	Percentage Composition.		Remarks.
	Copper.	Zinc.	
White brass....	45	55	Almost silver-white in colour. Sometimes used for small castings.
Yellow casting brass	50	50	Used for castings. Cannot be forged.
Muntz metal ..	60	40	Can be rolled and forged. Used for sheathing ships.
Ordinary yellow brass	70	30	The most largely used brass. Is malleable, and is used for drawn tubes, for sheets to be used for brazed tubes, for making brass wire, and for many other purposes.
Boiler-tube brass	80	20	Is drawn into tubes for marine boilers, and when hammered into very thin sheets is used as "gilding metal."
Red brass	90	10	Sometimes used for rolling into leaf.

Manufacture of Brass.—The price of copper being much higher than that of zinc there is a natural tendency to use the largest permissible proportions of zinc in brass. Small pieces of zinc are added to molten copper, and the mixture is carefully stirred. A small proportion of zinc is lost by volatilisation, and a rather larger proportion than that required in the finished brass is therefore added.

Impurities in Brass.—Brass frequently contains traces of arsenic, antimony, and bismuth, all of which tend to harden the metal and increase its brittleness. These impurities are therefore objectionable in brass which is to be rolled. About 2 per cent. of lead is often added to brass which is to be used for castings, as the lead renders the alloy more easy to work with tools.

Iron in Brass.—The strength and density of brass is considerably increased by the addition of from 1 to 2 per cent. of iron. *Delta metal* is a yellow brass which owes its abnormal strength mainly to iron. The composition of Delta metal is varied to suit the purposes for which it is required, but the following may be regarded as a typical analysis:—Copper, 56; zinc, 40; iron, 1; phosphorus, 0·1; manganese, 0·9; and lead, 2 per cent. Many other brasses containing iron in small proportion are manufactured for special purposes.

Tin in Brass.—Tin in very small proportions also strengthens brass in which it is present and is sometimes added to brass manufactured for special purposes.

Aluminium in Brass.—Aluminium may in some cases be added with advantage to brass in proportion not exceeding 3 per cent. The aluminium increases the fluidity of the molten alloy, and brass in which it is present is therefore especially suitable for castings. The aluminium does not render the alloy unsuitable for rolling, stamping, or forging.

The Properties of Alloys.—The properties of alloys are frequently entirely different from those which mixtures of the metals of which they are composed might be expected to possess.

The colour of the alloy is often quite different from that of any of its constituents. Thus, when the white metal aluminium is alloyed with the yellow metal gold, an alloy of a ruby-red colour is obtained.

The melting point of an alloy is usually lower than the mean melting point of its constituents, and is sometimes lower than that of any of its constituents. Rose's metal, for example, which is an alloy of lead, tin, and bismuth, melts at 92 deg. C., which is lower than the boiling point of water, yet the melting points of lead, tin, and bismuth are 330, 235, and 270 deg. C. respectively.

An alloy frequently resists corrosion better than any of its constituents.

Alloys are commonly regarded as consisting of one or more metallic compounds held in solid solution in an excess of the predominating metal. It is believed that the metals unite with one another in certain definite proportions, and that these combined metals dissolve in that portion of the predominating metal which remains uncombined.

Alloys are not usually perfectly homogeneous after solidification. As the temperature of a molten alloy falls, that portion of the predominating metal which remains uncombined first solidifies, but holds disseminated throughout its mass a certain quantity of a liquid alloy of the predominating metal and another metal. As the mass continues to fall in temperature the liquid combination of metals also solidifies, and a temperature is finally reached at which the whole mass becomes solid. The solidification of an alloy may occur in several stages, for the number of metallic combinations, each having a different solidifying point, may be many.

The melting point of a combination of metals varies with the proportions in which the metals are combined, but it is impossible to reduce the melting point of any mixture of metals below a certain temperature. Thus, by mixing tin and lead in the proportion of 4 atoms to 1, an alloy which melts at 187 deg. C. may be obtained, and by altering the proportion to 3·3 of tin to 1 of lead, the melting point may be reduced to 180 deg. C. No other alloy of the same metals has a lower melting point. An alloy having its constituents proportioned to yield a combination having the lowest possible melting point, is called a *eutectic* alloy (Greek: *eu*, well; and *tekein*, to melt). The alloys of commerce are in most cases mixtures containing several eutectic alloys.

The phenomenon of "eutexia" is not restricted to mixtures of metals, but is also common to certain mixtures of salts and to certain mixtures of fatty and other acids. Mixtures in which the components have the property of acting together to form a mass having a definite melting point lower than that of the mean of its constituents, and incapable of being further reduced, are called eutectic mixtures.

NATIONAL ASSOCIATION OF MASTER HOUSE PAINTERS.

The annual convention of the National Association of Master House Painters and Decorators of England and Wales was continued last week at the Grand Assembly Rooms, Barras Bridge, the President, Mr. J. G. Cole, presiding.

The proceedings opened with a paper by Mr. R. G. Hatton, the head art master at the Durham College of Science, on "The Training of the Apprentice in Drawing, Designing, and Colouring." There were, he thought, two ways in which the apprentice might be trained. They could either train their shop from the top downwards, or from the bottom upwards. By the first method, the master-men and the foremen were themselves the authority, and advised and instructed the apprentices under them. But if they were to carry out the other system, of training the shop from below upwards, they must recognise that they could not carry out these older conditions. They must recognise that they would have to educate the shop through the apprentices, and they must consequently make arrangements by which the apprentices should receive the kind of instruction which the master thought they should need, and grow thus into better and more efficient workmen than the men they were displacing. This system

would in the present day probably be found working simultaneously in good shops. Continuing, Mr. Hatton said that there seemed to be arising an epidemic of embossed papers. He was not saying a word against embossed papers, which were very useful and very handy, but, in his opinion, they were tending to drive out the need for certain skill on the part of the decorator which he formerly had. It was only natural to think that there would be a tendency for using these appliances which would gradually eliminate the craft of the decorator, and the man who was jealous of his craft would look askance upon the introduction of any mechanical means which would tend to reduce the skill of hand and eye. On the subject of drawing, Mr. Hatton pleaded for vigour and spirit of line rather than for mere mechanical precision.

Mr. Geo. G. Laidler (Newcastle) moved a vote of thanks to Mr. Hatton, and, in doing so, alluded to Mr. Hatton's comments on the subject of embossed materials. They were employing embossed materials very largely, and he thought the material had come to stay. That was because it was taking the place of bad plaster work. It was bad plaster work which had introduced embossed canvas and other materials. They had got to use it, and they would continue to use it in preference to putting good painting on bad plaster work. The result of the existing state of things would be, he believed, that in time they would become their own plasterers. The good painter should always have a good plasterer in his shop to carry out plastering work worthy of his establishment.

Alderman Green seconded, and the vote of thanks was carried.

Mr. Lewis F. Day next read a paper on "The Art and Trade of the House Painter." Mr. Day said that there was a time when all art was decorative, but that had changed altogether, for now decoration was only a division of art, and house decoration only a division of that. Art and craftsmanship were inseparable. It was difficult to draw a hard-and-fast line between them. The moment the consideration of beauty, apart from utility, entered into the calculation of the workman, he touched upon the domain of art. It was all but impossible for a man to carry workmanship to its furthest point without concerning himself about its beauty, and that was art. It was quite possible, nevertheless, for a man to carry on his trade without a regard for art. The modern change was due largely to the fact that, whereas house decoration used to be in the hands of the workman or under the direction of a man who had been a workman, the tendency was more and more for the trade to get under the control of the enterprising man of business. The mischief was not that the decorator had to make it pay, but that the desire to make it pay so well was so strong that the workman and his best qualities were being swamped by the necessity for making the enterprise he was engaged in pay the largest possible profit to the men who were running the enterprise. Things were tending nowadays to be on such a large scale that the presence of the man of business was necessary, and unless that man of business was an artist—which they could hardly expect him to be—or left the control to a man who was an artist, which he did not generally do, how was it to be expected that the work done under such auspices should be artistic? Art of any kind, he admitted, did not sell best, but it paid. It was the best advertisement, it made people talk, it spread the decorator's fame, and perhaps brought customers for trade work. Was there ever a better advertisement for drain pipes than art pottery? What applied to pottery applied to house decoration. The good artist with practical qualifications and no desire to undertake more than he could personally supervise could always make a living, and, if anybody was to be envied, perhaps he was the man. But the point to which he wished to call their attention was that the house decorator need not be a great artist, need not, in fact, have much more than a workmanlike appreciation of good work well done, to raise his trade to something of an art, if he only had his ideal and the courage of it.

Mr. Gaskell moved a vote of thanks, which was seconded, and, after some discussion, to which Mr. Day replied, the vote was carried.

The conference adjourned.

GENERAL BUILDING NEWS.

CHURCH, WEST DERBY, LIVERPOOL.—On the 23rd ult. the foundation-stone of a new church was laid at West Derby. It will form a chapel-of-ease to the parish church. The site is situated at the hamlet known as the Dog and Gun, about a mile and a half from West Derby village, at the junction of four cross roads, Carr-lane, Lowerhouse-lane, and Dwerryhouse-lane. Designed by Mr. Jno. Oldrid Scott, the church will be of stone, in the Early English style, and will be of cruciform shape, with nave, apse, two transepts for the organ and vestries, and surmounted by a small central tower. The edifice is to accommodate some 300 worshippers. The contractors for the new building are Messrs. Lowe, of Burton-on-Trent.

CHURCH, PLAISTOW.—A new church is to be erected at Harold-road, Upton Manor (London Fifth Circuit). The estimated cost of the new church and school is 5,300*l*. The new buildings (designed by Mr. W. H. Dinsley, of Chorley) will occupy a corner site, having frontages to Harold-road and Claude-road. The complete scheme consists of the church, orchestra, minister's vestry, choir vestry, schoolroom, five classrooms, cloakroom, &c., the whole of which is at present being erected except the schoolroom and two of the classrooms, in place of which an iron structure has been put up temporarily to serve for school purposes. The principal approach to the church will be from Claude-road, with two secondary entrances from Harold-road. The rostrum will be placed at the end of the church opposite to the front entrance. The orchestra will be situated immediately behind the rostrum, and connected with the church by an arched opening. Galleries will be provided on one end and two sides of the church, and approached by four separate staircases. At the junction of Harold-road and Claude-road elevations a tower will be placed, finished with a copper-covered dome. The schools will have their main frontage to Claude-road, and behind the school rostrum will be placed a classroom, divided from the school by revolving shutters. The church will provide accommodation for about 600 adults or a mixed congregation of 700 persons, and the school for about 330 scholars. The main elevations will be faced with red brick, relieved with Bath-stone dressings. Messrs. Battley, Sons, & Holness, of Old Kent-road, S.E., are the builders. Mr. W. R. Ridington is acting as clerk of the works.

CHURCH RESTORATION, HARTSHORNE, DERBYSHIRE.—The parish church of St. Peter, Hartshorne, South Derbyshire, is being restored. Consisting of square embattled tower, chancel, nave, and north aisle, the edifice externally bears heraldic carvings, while the benches of the interior date as far back as 1590. The earliest parchments dated from 1594 are in good condition. Mr. G. F. Bodley, R.A., has submitted plans which have been accepted. The alterations comprise a new aisle and vestries, the restoration of the chancel, the opening out of the walled arches, with the addition of a baptistry, and when complete will provide additional seating accommodation for 100.—*Sheffield Telegraph.*

WESLEYAN CHURCH, BIRMINGHAM.—A new Wesleyan church has been erected in City-road, Birmingham. The plans, prepared by Mr. A. McKewan, provide for a church to seat 800, a Sunday-school, a lecture-room, classrooms, and a church parlour at a total cost of 3,700*l*. Messrs. J. Smith & Sons are carrying out the building scheme.

TOWER, ST. MICHAEL'S CHURCH, BRISTOL.—The tower of St. Michael's Church, Bristol, has just been restored at a cost of 1,200*l*. The tower is an example of the usual Somerset type, erected about the end of the fifteenth century. Originally an ancient church of the same date was erected on the site of the present building, which is of debased style, and quite out of harmony with the design of the tower. Some remains of the old church still exist, and they were preserved in the new school buildings near the church, and were incorporated in their design. Evidence exists that at the time of building the present nave and aisles the tower was extensively repaired and altered in the style of the period. These alterations have been, as far as possible, removed, and the old work restored to its original appearance. Every care has been taken not to destroy any of the old stonework that it was found possible to retain, so that the tower should preserve its ancient appearance. Much of the stonework was, however, so badly decayed that nothing but entire removal of certain portions was possible. The work has been carried out by Mr. A. J. Beaven, of Bedminster (the contractor), the architect being Mr. W. V. Gough.—*Bristol Times and Mirror.*

CHURCH, CORNHOLME, YORKSHIRE.—A new church was opened at Cornholme, near Todmorden, on the 27th ult. It stands close to the main thoroughfare leading from Todmorden to Burnley. Mr. C. Hodgson Fowler, F.S.A., of Durham, is the architect of the building. It consists of a nave 72 ft. by 24 ft., north and south aisles each 72 ft. by 11 ft., a chancel 37 ft. by 21 ft., with a north chapel and organ chamber, a sacristy, and a choir vestry on its south side, a western tower and spire, and a north porch.

CHAPEL, NORTH END, PORTSMOUTH.—A new Baptist chapel in London-road, North End, has just been opened. The new building is of brick, with stone dressings. In the centre gable above the arched porches is a traceried window, flanked on the left by a square tower, 64 ft. high, with traceried windows, and finished with lofty pinnacles. The pitch-pine roof is partially open work, and the building is also seated with the same material. There are two vestries, two lavatories, cloakrooms, and cellarage. The building has been erected by Mr. J. W. Perkins, from plans and designs by Mr. John Wills, of Derby and London.

ALTERATIONS TO WOODHOUSE CHURCH, YORKSHIRE.—The second part of the scheme of additions to and alterations of Christ Church, Woodhouse, having been completed, the chancel was consecrated recently. The second portion of the scheme includes the lengthening of the building eastward and the replacing of the old shallow chancel by one of larger proportions, by which there has been obtained a sacrarium and the requisite space for a choir of thirty members, separate vestries for the clergy and choir, with proper approach thereto, and the reseating of the transept in oak. The chancel has been erected in the Early English style of the rest of the structure. The outer walls are faced with ashlar, and the internal jambs and finishings of windows are deeply splayed and of the same material. In the gable at the east end is a large five-light window filled with coloured glass illustrative of the "Te Deum," and on the south side are two lancet windows representing the baptism and transfiguration of our Lord. The flooring is of polished oak blocks. The various fittings are all in solid oak. The pulpit is of octagonal shape, and is erected on a stone shaft. The electric light standards and brackets are of brass. The plans of the church alterations and designs for the fittings were drawn by Mr. W. Cooper, architect, Huddersfield, who has superintended the carrying of them out. The following is a list of the contractors and others who have been engaged in the various works: Mr. Mark Brook, mason; Mr. Henry Holland, joiner; Messrs. G. Garton & Son, plumbers; Mr. T. B. Tunnacliffe, slater and plasterer; Mr. T. W. Broadbent, electrician; Mr. S. Kendall, decorator; Messrs. Calvert & Co., heating engineers. The carving is by Mr. Edward Armitage, Springwood; and the stained-glass windows were designed and executed by Messrs. J. Powell & Sons, London.

CHURCH, AWSWORTH.—A new church has been erected at Awsworth, Nottinghamshire, from the designs of Messrs. Naylor & Sale, of Derby. The nave is 50 ft. long and 30 ft. broad, giving seating capacity for 200 persons. A tower, a side aisle, and other extensions are to be added at a future date. Part of the old schoolroom has been left for a vestry, and an organ chamber has been built on the north side. The reconstructed nave is composed of red brick, with stone dressings. The roof is an open boarded one.

PROPOSED RESTORATION OF THE CHURCH OF ST. THOMAS OF CANTERBURY, SALISBURY.—The fine fifteenth-century church of St. Thomas of Canterbury, Salisbury, is in great need of external repair, and a committee has been formed to raise 3,000*l*. for the purpose. The committee have placed the work in the hands of Mr. T. G. Jackson, R.A., who has reported that the nave arcades have settled westward, and that all the columns have a slight inclination in the same direction. He proposes to remedy this by adding substantial buttresses to the west end. The tower, he finds, inclines so much to the south that the point of the spire, which is 95 ft. from the ground, has moved about 2 ft. 3 in. from the perpendicular axis. The roof of the south chancel aisle is in a bad state, and will require reconstruction. It will also be necessary to take off and recast much of the lead on the roof. The total cost of the work, he mentions, would be 5,000*l*., and the committee have decided to proceed with the absolutely essential parts of it at a cost of 3,000*l*.—*Times.*

CHURCH, NEW ROSS, IRELAND.—The new parish church of St. Mary and St. Michael, New Ross, was dedicated recently. The church is designed in the Early English style, but with the somewhat foreign semi-decagonal apsidal termination to the chancel. On plan it comprises nave and aisles, double transepts, a deep chancel, two side chapels, and large sacristy and boys' vestry, so arranged as to be capable of being thrown into one. The materials used for the external walls were the stones of the district, the deep blue limestone for the walling and the fine white Newtownbarry granite for the dressings affording pleasant contrast. Inside the stone work is of Bath and Portland, relieved with a considerable quantity of red, green, and black Irish marbles. The principal entrance to the church is through the great western doors, deeply recessed, with marble nook shafts giving access to the narthex, over which is the organ gallery, carried on a carved Gothic arcade of three bays supported by solid quatrefoil shafts of black Kilkenny marble and bases of green Galway marble. The church affords accommodation for nearly 1,500 people. The floors are of wood block on Ebner's system, the passages, &c., being tiled with red tiles. The chancel and the chapels are tiled with a pattern of encaustic mediæval tiles made by Messrs. Craven, Dunnill, & Co. The high altar and side altars are of white Carrara and various coloured marbles. The green and white marble Communion rails, made by Mr. Edmund Sharp, of Dublin, have wrought solid brass gates, while black marble is freely used in the steps, &c. The door of the high altar tabernacle is interesting as the replica of a very curious old Dutch plaque, representing the Last Supper. It was copied from the original by Messrs. John Smyth & Son, of Dublin. The tower and spire reaches a total height of nearly 200 ft., and is surmounted by a wrought-iron cross, 12 ft., by Fagan, of Dublin. The organ has been made by Messrs. Telford & Telford, of Dublin. The wrought-iron ornamental work has been done by Mr. J. Fagan, of Dublin. The carved capitals and foliage work is by Mr. J. A. O'Connor, of Cork, and the fittings and other interior work have been carried out from the designs of Messrs. Walter Doolin, Butler, & D. nnelly, the architects, Dublin, while the general contractor was Mr. Andrew Cullen, of New Ross, who also made the confessionals and the organ gallery and screen. The total cost has been about 2,000*l*.—*Freeman's Journal.*

School, St. David's.—The new county school at St. David's was opened recently by Principal Griffiths. It is situated on the Haverfordwest-road, just outside the city, and it has cost about 1,800*l.* Mr. D. E. Thomas, Haverfordwest, was the architect, Messrs. T. Evans & Son the builders, and Mr. V. Morgan, St. David's, clerk of the works.

Board School, Northampton. — Barry-road Board School, Northampton, was opened recently by the Chairman of the Northampton School Board. The school has been erected from designs by Messrs. Law & Harris, and has, under the superintendence of Mr. Sidney Harris, been built by Councillor A. P. Hawtin. The total area of the site is 76,914 square feet, and in addition to the school buildings proper and the playgrounds, a swimming bath and laundry have been built, and a caretaker's house erected. The total cost, including the site, has been 24,396*l.* Accommodation has been provided for 420 boys, 420 girls, and 530 infants. In the boys' and girls' schools the classrooms are arranged on either side of the corridor, which is 10 ft. wide, and the schoolrooms are at one end. The infants' department contains a central hall, 57 ft. long and 31 ft. wide, with classrooms arranged around. The floors of the classrooms, central hall, and schoolrooms are of maple wood blocks laid on concrete, while the floors of the corridors, entrances, and cloakrooms are paved with Venetian mosaic. The internal walls are faced with glazed bricks to the height of 4 ft. from the floor, and above the glazed brickwork the wall is plastered and coloured. The swimming bath is a pool 50 ft. long and 20 ft. wide, and its depth varies from 3 ft. to 5 ft. Shower arms are also provided.

Sunday School, Erdington, Birmingham.—On the 25th ult. the Lady Mayoress of Birmingham and the Rev. E. A. Anthony laid the foundation-stones of the new Sunday school which is to be erected in connexion with the Congregational Church at Erdington. The main feature of the scheme is the erection of a lecture hall to accommodate 300 people, which will also be utilised as a Sunday school, and take the place of the present school underneath the church. Alterations are also contemplated in connexion with the kitchen and vestry accommodation to the church, and provision has been made near the front entrance for ladies' and gentlemen's retiring rooms. The buildings will be heated on the low-pressure water system. The work, which will involve a cost of nearly 1,800*l.*, is being carried out from the designs and under the superintendence of Messrs. Ingall & Son, architects, Birmingham, by Mr. J. E. Harper, building contractor, Handsworth.

Infirmary, Bristol.—A new infirmary is to be erected at Bristol for the sick poor. The architect is Mr. H. Percy Adams, of London. The revised estimate of the architect for the erection of the building is given as 141,993*l.*

Workshops, Fechney, Perth.—About a year ago the workshops in connexion with the Fechney Industrial School were destroyed by fire. A new workshop has now been erected. It is one story in height, and forms one whole shop roofed in three divisions. In it the turning and other operations connected with woodwork are conducted. The building is 66 ft. long by 52 ft. wide. Adjoining the main workshop and at the west end, separately enclosed, are the shoemakers' and tailors' departments. The principal elevation is in keeping with the other buildings, and the old clock and belfry have been replaced. The roof is of iron principals, and the door openings between the workshops are all fitted with double iron doors. The cost is estimated at 2,000*l.* The plans were by Mr. David Smart, architect, Perth. The contractors are—Mason work, Alexander Beveridge; joiner work, Thos. Forgan & Son; slater work, James Buchan & Son; plasterer, John Peebles & Son; plumber, James MacLeish; ironwork, Messrs. Robertson & Robertson, Perth Foundry.

The Foreign Cattle Market, Deptford.—On September 17 was laid the foundation-stone of the new chill-rooms which will be added to the existing market buildings, at an estimated cost of about 40,000*l.*, under the superintendence of Mr. Andrew Murray, City Surveyor, the contractors being Messrs. George Munday & Sons. The new extension will supply further space for 2,000 sides of beef; the present accommodation in that respect, upon which 37,000*l.* has been expended, affords room for 3,000 sides. Since they first acquired the market site, thirty years ago, at an outlay of 95,000*l.*, the Corporation of the City of London have expended 600,000*l.* upon structural additions and other improvements. In 1888 they erected, experimentally, four chill-rooms, with plant for freezing 400 sides; two years afterwards they increased that accommodation for the chilling of 800 sides at one time. In 1896 eight additional chill-rooms, for 1,200 sides, were built by Messrs. Rudd & Sons of Grantham, under Mr. Murray's direction, and fitted with refrigerating machinery supplied by the Haslam Foundry and Engineering Company of Derby. They have also provided twenty cooling-rooms and eighteen slaughter-houses, and tripe-boiling houses, erected by Messrs. Munday & Sons, together with another set of slaughter-houses built by Messrs. Rudd & Son, who contracted for 5,666*l.* A lairage and a new pier, affording a frontage of 900 ft. for the landing of live cattle, were constructed three years ago by Messrs. Kirk & Randall and Messrs. Rudd & Son, after plans prepared in the City Surveyor's offices. In 1898 the Corporation had obtained an Act of Parliament for carrying out a scheme based upon a report made by Sir J. Wolfe Barry, whom they retained as engineer for the works. The scheme, involving an estimated expenditure of some 90,000*l.*, embraced the acquisition of house property at Grove-street-gate, in Grove-street, Barnes-terrace, Prince-street, and Watergate-street, a tramway, railway lines to communicate with the London, Brighton, and South Coast Railway Company's branch line to Deptford Wharf, lairages, a junction of the three jetties, and other works.

Barnsley Hospital Extensions.—On the 25th ult. the new convalescent ward, which has been erected at the Barnsley Beckett Hospital, was opened. The work has been carried out under the supervision of Messrs. R. & W. Dixon, architects, the contractors having been Messrs. W. G. & L. England, and the sub-contractors Mr. S. Walker, mason; Mr. S. Rushforth, plumber and heating apparatus; Messrs. T. L. Stephenson, painters, &c.

Convent Chapel, Callan, Kilkenny, Ireland.—The foundation stone of the new Chapel of the Mercy Convent at Callan has just been laid by Cardinal Moran. The architects are Messrs. Wm. H. Byrne & Son, and the contractor is Mr. Kerwick, of Callan. The new church will be of Romanesque style and in keeping with the Convent, which stands close by. It will be oblong in form, with side chapels and sanctuary. It will be built of native limestone and externally finished to correspond with the house of the Community.

Additions to a Liverpool Restaurant.—An addition has just been made to the Crocodile, in Cable-street, Liverpool. The addition consists of a new dining-room, which has just been opened. The style of decoration and furnishing, which has been carried out under the direction of the architect, Mr. T. Price, by Messrs. G. H. Morton & Son, Ltd., is Baronial; the walls are panelled 8 ft. high with solid carved Dantzic oak. Repoussé copper panels are introduced in the framing, and there is a frieze 4 ft. deep, hand-painted in colours on a gold ground. The chairs and tables have been specially designed in the same character. The room will seat nearly 100 people.

Synagogue, Hull.—The foundation-stone has just been laid of the Hull Western Synagogue and schools. The site, which is in Linnæus-street, has a frontage of 52 ft. to Linnæus-street and to Convent-lane. It is 300 ft. deep, and contains a little over 1,700 sq. yards. Linden House, which is a substantial and good building, has been considerably enlarged and altered, and converted into school premises for the Hull Hebrew girls' school, the plans for which have been approved of by the Board of Education, and certified by that Board for the accommodation of 217 girls and infants. The infants' school and classrooms, lavatories, cloakroom, &c., are on the ground-floor, and those for the girls, including teachers' rooms and stores, are on the first floor. There is a concrete playground in the rear of the building, with covered play-shed and seats. At the present time over 180 children are attending school. The synagogue is situate between the end of the playground and Convent-lane, and can be approached from Convent-lane as well as from Linnæus-street. The seating accommodation is for 400—250 on the ground floor and 150 in the ladies' galleries. The main entrances are at the west end of the building. They open on to the outer vestibule, which communicates with the inner hall, and so to the main building. On either side of the inner hall are stone staircases leading to the ladies' galleries, their vestry, and cloakroom. The minister's vestry and men's cloakroom are placed adjoining the vestibule. The whole of the building will be heated by low-pressure steam radiators, and electric lighted. The contractors are Messrs. Morrell & Sons, with the following sub-contractors:—M. Garton, joiner; C. Noble, stonemason; W. G. Padgett, plumber; W. Folkhard & Son, slaters. Mr. B. S. Jacobs is the honorary architect.

Proposed New Church, Acton.—In furtherance of a project for the building of a new Wesleyan church at Acton, the resident members of that community have entered into negotiations for the purchase of The Oaks as a site for the church, at a cost of 2,500*l.*, towards which amount subscriptions to make up a balance of about 1,000*l.* are still required.

Proposed Inebriates' Home, Yorkshire.—A meeting of the Yorkshire Inebriates' Act Joint Committee was held on the 29th ult. at the Town Hall, Leeds. Plans, which had been prepared by Mr. Vickers Edwards, the West Riding surveyor, for the erection of the administrative block and four blocks of cottage homes at the proposed County Inebriates' Home at Cattal, between York and Harrogate, were submitted, and considered at length. The four blocks of the cottage homes, three of which are to be reserved for women and one for men, each holding twenty inmates, will be situated on opposite sides of the administrative block. After discussion the plans were provisionally approved, and the General Purposes Sub-committee was authorised to get out and approve of detailed plans and specifications, and also to obtain tenders for submission to the full committee.

SANITARY AND ENGINEERING NEWS.

Waterworks, Kintore, Aberdeen.—An inspection by the members of the Kintore Town Council of the new waterworks, just completed, took place on the 23rd ult. The new water supply commences on the boundary between the parishes of Kintore and Kemnay. The spring there, known as Blackland Well, has a yielding capacity of 6,000 gallons a day. The next spring is situated about 250 yards below Blackland Well, and has a yielding capacity of 27,000 gallons a day. From this point the water is carried in a 4-in. pipe through below the railway culvert to Clovenstone Spring, which has a yielding capacity estimated at 10,000 gallons a day. The new supply then passes the farm of Ratehill, along the public road past the town head to the Town Hall, from which point 2½-in. pipes distribute the water throughout the burgh. The reservoir is situated on Ramsay's Croft, and has a holding capacity of 60,000 gallons. The contracts for the fitting of the pipes and all the other works were carried out by Mr. John Leask. The engineer of the works was Mr. William Bremner.

Bath Water Works.—A special meeting of the Water Works Committee was held on the 25th ult. to consider the report of Mr. Fox, C.E., recommending a scheme prepared by Mr. Gilby, the City Engineer, to augment the supply by a reservoir, and acquiring fresh springs in the Ayford Valley, the estimated cost being 90,000*l.* Mr. Fox was present, and the outcome of the meeting was a request to Mr. Fox to prepare a supplementary report as to the possibility of a modified scheme being adopted.

Widening London Bridge.—Satisfactory progress is being made with the work of widening London Bridge, which was begun about six months ago. The last span of the first of the two temporary foot-bridges, which have to be erected before the present footways can be pulled up, has been placed in position. Approximately, the total cost of the alterations will be 100,000*l.*, and the work is expected to take about another eighteen months. When completed, the new footways will measure 14 ft. from parapet to kerb, as against the 9 ft. 6 in. of the old, while the new roadway will average 37 ft., representing an increase in width of 2 ft. 7 in.

FOREIGN.

The Memorial Greek Church, Shipka Pass.—A large and costly church which has been erected by the Russian Government at the foot of the Shipka Pass was consecrated on Thursday, September 25. The church, planned and designed by Professor Vosnesenski after the customary Greek type, is a gift to Bulgaria, and is intended to commemorate the engagement, extending over five days in August, 1877, between the Russian and Turkish armies at the Pass, in which as many as 80,000 men were killed or wounded.

France.—The competition for designs for a "Hôtel de Caisse d'Epargne" at Chambery has been decided, and the first premium and the commission to carry out the building awarded to M. Martin, architect, of Grenoble. The second premium of 40*l.* was awarded to M. Revol, architect, of Tencin, and the third, of a value of 20*l.*, to MM. Morard & Bonnat, of Chambery.

Greece.—The works recently begun for the restoration of the famous colossal statue of a lion, which was erected on the battlefield of Chæronea in Bœotia in memory of the war against Philip of Macedon, are being actively carried on under the superintendence of M. Sotiriades, the archæologist. He has discovered near the battlefield a large tumulus, the contents of which tend to show that it is one of the tombs of the Macedonians slain in the battle.

Australasia.—The Art Society of New South Wales has been amalgamated with the Society of Arts, and the government of the Colony has given a subsidy of 400*l.* to the Society to further its work. This action has been principally brought about through the agency of the Minister for Public Instruction.——A wireless telegraph plant has recently been landed in Brisbane to the order of the Queensland naval authorities. With this plant it is intended to communicate over thirty miles, between Cape Moreton and Brisbane.——A bronze statue of the late Premier of Queensland, executed by Mr. B. Mackennal in London, has arrived in Brisbane, and is shortly to be erected in that city.——The harbour accommodation of Melbourne is about to be considerably improved, and the matter has been taken up by the Railways Standing Committee. It is proposed that a straight cut shall be made from Port Melbourne to the river wharves, the channel to be 900 ft. in width.——It is proposed in Sydney to appoint a Royal Commission to inquire into the question of the selection of suitable sites for the erection of hospitals for consumptives. ——The foundations of the new premises for the Sydney Harbour Trust Commissioners have been completed, and it is anticipated that the superstructure of this important building will be practically completed before the end of the year.——The Queensland Cabinet has decided to grant the Brisbane Technical College authorities a site for a new college in the city. The site is said to be one of the finest in Brisbane, giving a grand view of the

whole of the district.——Large business premises, the headquarters of the Citizens' Life Assurance Co., will shortly be opened in Wellington, New Zealand. The same company is also erecting large branch offices in Collins-street, Melbourne.

Brick and Tile Factory in Russia.—At the seaport town of Theodosia, in South Russia, a brick and roofing tile factory has (an official report states) been erected and opened by a Franco-Swiss company. It is capable of producing about 40,000 bricks and about 5,000 tiles per day. The roofing tiles manufactured are of the flat kind, and known locally by the name of "Marseilles tiles," from which place (Marseilles) large numbers are imported to the Black Sea ports. The machinery for making the bricks and tiles was imported from France, and the motive power—Laval's steam turbine—from Sweden. At present about 100 labourers are engaged regularly at the works.

South Russian Timber and the London Market.—Mr. H. P. Smith, British Consul at Kieff, reports to the Foreign Office that the efforts to create a direct trade in timber between the United Kingdom and South Russia do not appear to have been so successful as those interested would desire. Sample cargoes of pine were sent by two firms to London viâ Odessa, but the results were very unfavourable. The cargoes seem to have reached London at an unsuitable time, and the brokers did not seem to recognise the possibilities of the trade. The pine in question was considered equal to the II. and III. White Sea qualities quoted on the London market at the time at 11*l.* 10*s.* per standard of 105 cubic ft., while the "Dnieper" quality was selling in Kherson—the outward port—at 9*l.* 13*s.*, so that there was a sufficient margin to cover freight from Odessa to London. The opinion of those interested in this trade, Mr. Smith gathers, is that great benefit would result to both sides if a direct connexion with the British market could be arranged.

MISCELLANEOUS.

Professional and Business Announcements.—Messrs. Lamigeon & Co., marble merchants, have removed from 28, City-road, to Finsbury-pavement House, Finsbury-pavement, E.C.

The Proposed Edinburgh Art School.—Edinburgh Town Council, at their meeting on the 23rd ult., discussed the subject of a central School of Art in Edinburgh on a minute of a special meeting of the Lord Provost's Committee on the subject. The Town Clerk made a long statement on the report of the Lord Provost's Committee, which had considered the question, and ultimately the decision come to by the committee was adopted, to the effect that when any definite scheme is submitted to them with the sanction of the Scotch Education Department, and especially with the approval of the governors of Heriot's Trust and the other existing schools, they will be prepared to give it full consideration.

Honduras Mahogany.—The exports of mahogany from Honduras in 1901 amounted, according to the official statistics of the Colony, to 6,485,952 ft., value 359,250*l.*, as compared with 7,994,378 ft., value 438,589*l.*, in 1900, and 6,499,168 ft., value 378,675*l.*, in 1899. Governor Wilson, in reporting these figures to Mr. Chamberlain, as Colonial Secretary, explains that three large firms of mahogany and logwood merchants suspended operations during 1901, which doubtless accounts for the decreased exports, but the most serious aspect of the case is that those who have continued in the business complain of losses on their shipments, and declare their intention to restrict their operations. If they devote their capital to other industries the Colony will soon recover its prosperity, but up to the end of the year no movement in that direction appears to have taken place. The exports of mahogany, which in 1895 and 1896 were only 2,868,346 ft. and 2,769,676 ft. respectively, increased at a bound in 1897 to 6,777,382 ft., and in 1898 to 7,630,252 ft., decreasing in 1899 to 6,499,168 ft., only to rise again in 1900 to 7,994,378 ft. In the meantime the mahogany trade was being pushed in West Africa, and it would appear that the supply has in consequence exceeded the demand. The Customs returns do not disclose any adequate reason in the fluctuation of prices for the great increase of exports in 1897 to 1900, as the price per foot is shown as highest in 1896 and 1898, and that for 1901 was somewhat higher than for 1900, although there are wide complaints that the trade has become unremunerative. "I am afraid," the Governor adds, "that the deductions to be drawn from this circumstance are that the value of the wood cannot always be accurately ascertained by the Customs officers, and that the large quantity of wood cut in recent years has exhausted the supply in easily accessible areas, and the cost of haulage of what is now available is excessive; the cost of production is therefore higher than formerly. It is probable, moreover, that the losses on measurement in England have a material bearing on the profits of the trade. I have been afforded a perusal of a recent sale catalogue of mahogany from which I gather the following particulars:—The 'extreme contents' of the shipment amounted to 221,314 superficial feet, whereas the 'sale contents' are returned as 157,429 ft. a loss of 63,885 ft. or 28·86 per cent. of the shipment. A careful inquiry into the cause of this and similar discrepancies might result in a means being discovered of minimising these losses, to the great advantage of the exporter. A general review of the export trade seems to show that for some reason not very clearly indicated, but doubtless owing to an increased demand for mahogany and better prices, almost all other industries began to be neglected in 1897, and the energies of the population were devoted to increasing the output of mahogany, and that this trade proved remunerative for three or four years, but is now undergoing the inevitable period of depression following inflation."

Reredos, St. Martin's Church, Caerphilly.—A new reredos, erected to the memory of the Rev. Thomas Jenkins, has just been dedicated at this church. It was built by Mr. Clarke, sculptor, Llandaff, from designs prepared by Mr. George E. Halliday, the diocesan architect.

Improvements in the Royal Courts of Justice.—During the Long Vacation the opportunity was taken to effect an improvement of the ventilation with an installation of fans for the withdrawal of vitiated air from the vicinity of the several courts and corridors; and a jury box has been constructed in Court 1 of the King's Bench Division in order that the Court may, upon occasion, be available as an additional Court for the trial of cases by jury.

Richmond Parish Church, Surrey.—As a memorial to the late Canon Procter, who was vicar during thirty-three years, it is proposed to open a fund for the enlargement and improvement of the parish church of St. Mary Magdalene. The project comprises the erection of a new chancel, with rood and screen, and of aisles and vestries. The late vicar had collected a sum of 3,000*l.* for the former purpose; the extended scheme will, it is estimated, cost about 4,000*l.* more. The present fabric retains the old tower with turret of Sheen church, constructed of stone and flint laid chequer-wise; the body of the church, built of brick, is more modern, and consists of a nave, aisles, and chancel, as enlarged in 1750. Eighty years ago a sum of 2,000*l.* was expended upon the repair of the fabric. The church contains a cenotaph, by Flaxman, in memory of the Rev. Robert Mark Delafosse, of Richmond Academy, with a medallion portrait and two figures, in high relief, of mourning scholars; the grave, near the altar rails, of Mrs. Yates, the actress (1787), and her husband; and a brass tablet set up by Lord Buchan in memory of James Thomson, the poet. The marble monument, with medallion portrait, of the Hon. Mrs. Barbara Lowther (1805) is also by Flaxman. In the churchyard is the vault, with monument, of the Viscounts Fitzwilliam, in which was buried (1816) Richard, seventh Viscount, who founded the Fitzwilliam Museum at Cambridge. A tablet at the west end, near the tower, was set up by Charles Kean in memory of his father. In the churchyard was buried Heidigger, many years director of the Italian opera. The registers record the burial (1703) of William Gibson, the miniature and portrait painter, and the baptism, on March 20, 1680-1, of "Hester, daughter of Edward Johnson"—the Stella of Swift.

The Broderers Company's Exhibition.—In the course of next spring the Broderers Company will open an exhibition of embroidery. The exhibited work will be divided into three classes, and the Company offer seven prizes, to range from 21*l.* to 5*l.* 5*s.*, for award in each class. The three divisions consist of figure embroidery, sacred or secular; embroidery, either sacred or secular, executed in a frame shaded in silks, or in silks and gold; and embroidery as applied to ornamental or useful articles, and applique work or handwork (in silks or crewels) shaded or for the adaptation of the greatest number of stitches. Competitors can choose their own designs, materials, and colours.

The Petroleum Treatment of Roads.—Advantage was taken of the fine weather which prevailed at the end of last week to carry out the proposed experiment with oil upon a portion of the London and Southampton road between Farnborough and Aldershot. This is a thoroughfare much frequented by motorists and cyclists, and is near the great camp of the First Army Corps. Two thousand five hundred gallons of Texas heavy oil were supplied for the purpose by the proprietors of the *County Gentleman*, and the oil was placed upon the road under the immediate supervision of the County Surveyor of Hampshire. The oil was laid upon three-quarters of a mile of road commencing at the thirty-second milestone from London. Several dressings were given, the oil being first distributed by means of a watering-cart, and subsequently, in order to secure an even distribution, the men went over the length with large watering-cans. The oil soaked quickly into the road and left the surface well knit and firm. The treatment was immediately successful in preventing dust. On the Sunday a large number of motor-cars passed along the road; on the oiled portion they raised not a speck, but immediately that was passed they disappeared in a whirlwind of dust. It was feared that the smell from the oil would be found objectionable, but the odour was much less than was anticipated, and while objected to by some people was considered by others to be not unpleasant. It is rapidly passing away. A large number of questions have to be decided in connexion with this experiment, such as the relative cost compared with watering, the effect of the oil in consolidating and preserving the road, the extent to which it will prevent the formation of mud, &c. In due course a report dealing with these and other points will be issued by Mr. W. J. Taylor, the County Surveyor of Hampshire, and Mr. W. Rees Jeffreys, the Hon. Secretary of the Roads Improvement Association, under whose joint direction the experiments have been made. It is hoped, however, that the one treatment with oil will for many months render watering or a further application of the oil quite unnecessary.

The Labour Market Abroad.—The October circular of the Emigrants' Information Office states that in New South Wales the building trade at Sydney continues busy, and there has been a demand for skilled plumbers, but all other trades are depressed. In Victoria there is no general demand for more labour, and many men are out of work. No large public works are being proposed by Government which might provide employment. In South Australia there is no demand for more labour at the present time. The last report from the Government Labour Bureau in Queensland shows that in the north there was no demand for any one except female servants and some general labourers; in the central districts there was practically no demand; and in the south there was a good demand for agricultural labourers and general labourers only. The last report of the Government Labour Bureau in Western Australia shows that there is an ample supply of men in the building and other trades at Fremantle, Coolgardie, Albany, and other towns, and on the goldfields many are out of work, but there is a demand for them in one or two small places, such as Menzies and Northam. In New Zealand there is a good opening for a limited number of mechanics, but not for general labourers. In Natal no one is now allowed to land without a permit, which must be applied for personally at the Permit Office, 47, Victoria-street, S.W. The applicant must possess 100*l.* or prove that he is in a position to maintain himself in South Africa. There is now no special demand for more artisans, a large number of carpenters and others in the building trades having lately arrived, but skilled men can find work. The following persons are wanted for the Government railways; engagements are for three years; candidates must apply to the Agent-General for Natal, 26, Victoria-street, S.W., enclosing particulars as to age, height, whether married or single, with medical certificates and testimonials; free passages are provided, and half pay during the voyage:—Good platelayers between twenty-five and forty years of age, with five years' experience, wages 11*l.* to 15*l.* a month; carriage and waggon examiners having five years' experience, wages 9*s.* a day. Permits (see above) are required by those going to the Transvaal and the Orange River Colony. These will not be valid unless endorsed by the representatives of those colonies at the port of disembarkation. There is a fair demand on the Rand for really first-class mechanics in the building trades at an average wage of a little more than 1*l.* a day; but the market is limited, and emigrants must remember that the cost of living is at least double that in England, rent being especially high. There is no demand for ordinary labourers, of whom there is a large local supply, the discharge of the irregular forces after the war having thrown large numbers of labourers on the market.

Architectural Discovery, Little Marlow.—Three interesting discoveries have been made at the ancient parish church of Little Marlow, Bucks, which is now being thoroughly restored. In the chancel wall was found an old "priest's door," which had been so completely blocked up that only a careful inspection could trace any indication of it in the rough rubble surface that the wall presented. Careful cleaning and clearing out has given back the complete stone arch, with some of its mouldings. The second "find" is the original opening to the rood-loft, though no indication remains of the position or character of the steps by which it was approached. The third discovery was made within a cavity in the wall which constituted once the opening to the loft, and consisted of a Norman piscina, which retains its old dog-tooth mouldings. This was simply deposited in the hollow space left when the surface of the entrance was plastered up, it is supposed, at the Reformation. It is to be replaced in the corner from which it was torn.—*Times.*

Electric Lighting, Leeds.—On the 30th ult. the members of the Leeds City Council inspected the new buildings and plant in Whitehall-road, at the invitation of the Chairman of the Lighting Committee, Ald. R. Wigram. The extension of the works has been purposely made very large in order to meet the requirements of the future. The site which the Corporation had available for the new works covered an area of 290 ft. by 181 ft., and the whole of this land has now been built on. The buildings consist of engine-house, switch-room, cable cellar, boiler-house, stores, and workshops. The engine-house is 220 ft. in length and 65 ft. wide. Its total height is 44 ft., and 33 ft. to the 30-ton overhead travelling crane, which has been erected by Messrs. J. Booth & Bros., of Rodley. The switch-room, alongside, is 170 ft. long and 28 ft. wide. The boiler-house is 231 ft. long and 82 ft. wide, and in the middle of it is placed the chimney, which is 210 ft. high. Over the boiler-house is the coal-

store, capable of holding 4 000 tons of coal. The Corporation's Engineer is Mr. H. Dickinson.

The Slate Trade.—The stoppage of strike pay, which has been anticipated for some weeks, though strenuously contradicted, together with the firm tone of Lord Penrhyn's letter, will cause many men to seek re-admission to the quarry at this week's letting, but it will take many months, probably years, to make up the output before the strike.

The Acme Wood Flooring Co.—The company ask us to mention that notwithstanding the recent fire at their Victoria Dock wharf and sawmills the execution of orders in hand and of new orders will be in no way interfered with, arrangements for this having been made at their other mills.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

10,958.—Manufacture of Portland Cement: *E. H. Hurry and H. J. Seaman.*—A pressure of air which greatly exceeds that of the atmosphere is kept up, and the heat is at the same time increased, in the adoption of a high furnace or of means for throttling the combustible gases, in their escape, with a weighted fire-clay valve which is inserted at the top of the furnace. A pipe conducts the gases to a hot-blast stove, or an upper pipe may lead them into a calcining chamber which is provided for abstraction of carbonic acid from the cement materials; an open chute turns the contents of that chamber towards the outlet of the stack. The furnace includes a lined shell, a feeding-bell, a crucible or hearth, tap-holes, tuyères, and a blast-pipe. A car receives the molten material from the upper tap-hole, and a nozzle sprays water that disintegrates the material in the car, which is then hauled up an inclined staging for the conveyance of its contents to the grinding mill. A modified form of the top of the furnace provides for the supply of fuel into a chamber at the side of another chamber through which the materials are fed. As the air supplied by the tuyères to the fuel mingles with the material, the carbonic acid is forthwith expelled from the carbonate of lime. Clay or argillaceous material containing silica or alumina and carbonate of lime are intermixed with fuel and fed directly to the furnace; or the carbonate may be roasted firstly with the waste gases, which may be fortified with carbonic oxide by being directed through coal or coke in a gas-producer. The throttling of the issuing gases contributes to the fusion of the carbonate of lime in the hearth, or crucible, at the bottom of the furnace, and as carbonic acid is produced the carbonate of lime becomes calcined in a fused condition, and the resultant caustic lime mingles with the alumina and silica in the mass, whilst the incandescent fuel reduces the carbonic-acid gas to carbonic oxide.

10,962-3.—Anti-Fouling Compositions: *Coleman International Ship and Pile Co.*—For submerged surfaces of metal is employed a layer of paint made up of linseed oil, varnish gums, and turpentine or some such diluent, to which, before it has become dry, is applied a layer of either mineral or vegetable insulating material. Then over a second layer of paint are blown particles of copper which are hammered, rolled, or pressed into firm union with the insulating substance. Confer also Nos. 14,069 of 1899 and 10,962-3 of 1901.

10,978.—A Method of Centering for Arches: *A. B. Price.*—In constructing arches, floors, sewers, tunnels, and so on, with concrete, segments of sheet metal are laid upon adjustable sliding bars inserted through holes in the segments and held together with wedges and collars. The segments may be made of a flexible material that will admit of their springing upwards, and be pierced so as to meet differences of span.

11,010.—Machines for Scraping and Sweeping Roads: *D. Elliot.*—A brush geared to a sprocket wheel sweeps refuse into a scoop, a shaft worked by a wheel on the axle of the wheel of the machine throws the sprocket wheel into and out of gear, spiral or other springs are fitted on to the screws that adjust the brush-shaft. The scoop-shaft has guides, and when the scoop is filled will be drawn back by a linked lever; a handle on which is a sector in engagement with a pinion on the scoop-shaft and pivoted to a guided slide, serves to discharge the contents of the scoop into a receiver attached to the machine; or the scoop itself, when fixed, will serve for a receiver. In one of other forms the scoop is discharged into an elevator, and the scoop and brush are mounted upon a trolley attached to the cart, and geared to the wheel axle, with a segmental wheel upon its lower spindle for the working alternately of two intermeshing wheels, one of which has a spindle for working the scoop.

11,057.—A Combined Ruler and Protractor: *C. E. Price.*—A semicircular recess or groove is fashioned in the face of a flat ruler, and at the middle point of the edge of that face of the ruler is pivoted a protractor, which may be turned about upon the sunken face of the ruler.

11,060.—Improvements in Closet Seats: *H. Müller.*—The invention consists of the adoption of two seats, whereof one is hinged at the back, and can be held up when not used with a key, and the other is fixed underneath.

11,066.—A Self-closing Valve: *J. F. Braidwood.*—A valve which is to be closed by the pressure of the water has a spindle, in a guide, which fastens the valve-disc within the cap. Beneath the valve spindle is a vertical and screwed spindle that works the valve; otherwise a cam upon an axis serves for that purpose.

11,071.—Connections of Electrical Terminals: *J. Gray.*—For connecting leading-in wires to switch, fuse, and other terminals the inventor causes the conductors to be passed through openings in an insulating plate between which and another plate having conducting pieces they are clamped. The method is adapted also for lamp-holders, wherein the conductors may be gripped by a hollow metallic top which is screwed into the casing around the block to which the terminals are secured.

11,076.—A Contrivance for Use with Lightning-Arresters, Cut-Outs, and Switches: *H. Lamm.*—The arc-rupturing contrivance is made with its surface curved either wholly or in divisions and adjusted in approximation. For cut-outs a fuse connects the two surfaces, and for switches a plug is used between them.

11,150.—A Protective Covering for Walls, Ceilings, Vaults, &c.: *O. Mack.*—A flexible fire and water proof covering consists of wedge or prism-shaped moulding-strips having a backing of some textile fabric, with plaster or mortar, in which reeds or wooden cores are embedded, filled into the spaces. When the plaster has become set the surface is roughened, the strips are taken out and the rolled up sheet is secured and coated with plaster. For columns the covering is wrapped around segments and then coated with plaster.

11,152.—A Vice: *H. Hildmann.*—The movable jaw slides on a stem mounted upon the fixed jaw. On to the former jaw is pivoted a lever handle for adjusting the tool and having a brake-block that slides in a cam slot and is adjusted upon the lever so as to extend the range of the grip.

11,233.—Brakes for Winches and Hoisting Apparatus: *D. H. Andrews.*—The power-wheel and an arm work loosely upon a shaft; shoes mounted upon the arm engage with a loose ratchet-wheel; the ends of the arm are joined to the frame of the power-wheel with slotted arms set in engagement with pins on the frame; the shoes are pivoted on to toggle-levers, which are adjustably jointed to rods pivoted on to a double crank fixed upon the shaft, and are linked to lugs on the arm by means of toggles pivoted on the slotted levers which engage with other pins of the frame. When the wheel turns in one direction the first-named pins take the shoes around as they move in their slots, but as the load acts upon the drum the toggle-levers become straightened, and so impel the shoes against the ratchet-wheel and carry it around. A reversal of the wheel causes the links to straighten the toggles and to open the double crank and the toggle-levers, whereupon the machinery (the loose ratchet-wheel excepted) will run in the opposed direction.

11,275.—Appliances for Brick-Moulding Machines: *J. Davies.*—Beneath slits or grooves in the cutting table of an extension machine are a small trough and a large one, into which pipes convey lubricating oil, which is also directed to the stream of clay by means of a roller carried by an axle that turns in slots in the sides of the larger trough. A pipe, a stop-cock, and holes and a groove in the push-plate convey oil from a lubricator to the face of the plate.

11,345.—Construction of Ceilings, Partitions, &c.: *New Jersey Wire Cloth Co.*—To the flanges of the girders or beams are secured rods that carry the ceiling, and wire ties fasten sheets of wire netting or open-worked lathing to the rods. The partition plaster is sustained with meshed metallic sheets, of which the horizontal edges overlap one another, and which are tied to horizontal rods and to overlapping vertical rods. The upper vertical rods are hooked over the first-named rods, the lower ones being made fast in the floor. The rods and lathing are carried by holders driven into the walls, and struts hold up the lathing as the plaster is being laid. Otherwise, the horizontal rods may be woven into the lathing, or fastened with hooked clips on to an upright fashioned in one piece, and with hooked flanges.

11,423.—Fastenings for Use in Building Construction: *J. Erath.*—These consist of flanged spikes to be driven into the floor, beams, cement, wall, or roof for carrying the plaster slabs or plaster at a distance in order to make air spaces that will resist fire, deaden sound, and insulate damp; the spikes have heads from which detachable hooks may be hung, and also booked extensions for sustaining boards and centres when the plasterer is at work. After the plaster has become set the spike-heads are driven in and the notched extension-pieces are broken off.

11,506.—Traps for Drains: *W. H. Hammond.*—The inventor devises a wedge for the closing of the rod-eye; he causes the wedge to be pressed against a ground seat, and there are flanges for its retention.

11,508.—Means of Disinfecting Sewers and Drains: *J. Arnold.*—Disinfecting gas will be generated by the combination of certain chemical substances that are fed into an annular and trapped trough along which the gases will flow as they escape. If sulphuric acid and permanganate of soda are used, the latter is conveyed through a drip-tap from an annular chamber, whilst the former is put into a vessel from which it will overflow.

11,510.—A Lantern for Use by Sanitary Engineers: *W. J. G. Rawlings.*—The lantern, which is shaped as a tube, is adapted for use in the examination of drain and similar pipes by means of wheels that are attached by sunken screws to their axle, and its two lenses, or lens and reflector. The lantern is to be forced forwards with a rod screwed in a socket, and provision is made for its illumination by electricity.

11,530.—Apparatus for Refuse Destructors: *J. Forster and A. J. Liversedge.*—Refuse is stored and charged for the destructor in containers, of which the openings for discharge are disposed in the walls or crowns of the furnaces or cells of the destructor; a tilting or swinging platform or bridge is set between the furnace and the roadway for the carts that carry the material. The refuse is stored upon the bridge, which, upon being tilted, throws its load into the furnace.

MEETINGS.

Friday, October 3.

Architectural Association.—Annual general meeting. (1) Address by President, Mr. H. T. Hare; (2) Distribution of Prizes. 7.30 p.m.

Sanitary Institute (*Lectures for Sanitary Officers*).—Dr. E. J. Steegmann on "Meteorology." 7 p.m.

Saturday, October 4.

Sanitary Institute (*Demonstrations for Sanitary Officers*).—Inspection at Wimbledon Sewage Works.—2.30 p.m.

Sanitary Inspectors' Association.—Annual general meeting, the Crown Room, Holborn Restaurant, W.C. 6 p.m.

British Institute of Certified Carpenters (*Carpenters' Hall*). Monthly meeting. 6 p.m.

Northern Architectural Association.—Excursion meetings, when the following buildings will be inspected:—Benwell Presbyterian Church, and also, if time, &c., permit, the Parish Church; College-road Presbyterian Church will next be visited. Members to assemble at Benwell, at the Elswick-road tram terminus, at 3 p.m.

Monday, October 6.

Society of Engineers.—Mr. A. R. Galbraith on "The Hennebique System of Concrete Construction." 7.30 p.m.

Liverpool Architectural Society (*Incorporated*).—(1) Opening Address, by the President. (2) To discuss and approve the Revised Schedule of Charges (meeting adjourned from June 9, 1902). 6 p.m.

Tuesday, October 7.

Sanitary Institute (*Lectures for Sanitary Officers*).—Dr. J. Priestley, B.A., on "Sanitary Law." I.—7 p.m.

Wednesday, October 8.

Institute of Sanitary Engineers, Ltd.—Examination and Literary Committee at 4 p.m.; General Purposes and Finance at 4 p.m.; Election Committee at 5.15 p.m.; Members' Sessional Meeting at 7 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Dr. J. Priestley, B.A., on "Sanitary Law." II.—7 p.m. (Inspection at Lambeth Disinfecting Station, Wanless-road, Loughborough Junction, at 2.30 p.m.)

Thursday, October 9.

Manchester Society of Architects.—The First Sessional Papers Meeting will be held at the Board Room of the Chamber of Commerce, 44, Mosley-street, when the President, Mr. Alfred Darbyshire, F.S.A., will read his presidential address.

Friday, October 10.

Sanitary Institute (*Lectures for Sanitary Officers*).—Dr. J. Priestley, B.A., on "Sanitary Law." III.—7 p.m.

Saturday, October 11.

Incorporated Association of Municipal and County Engineers.—Home District meeting at Aldershot.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 17.—By W. Brown & Co. (at Chesham).

Hawridge Common, Bucks.—A freehold farm, also four cottages, area 16 a.	£1,700
A freehold meadow, 6 a. 2 r. 19 p.	380
September 18.—By W. Brown & Co. (at Great Missenden).	
Prestwood Common, Bucks.—A freehold holding, 2 a.	205
Wycombe-rd., four freehold building sites, 2 a. 2 r. 24 p.	196
Missenden-rd., &c., 17 freehold building plots	386
September 19.—By T. E. Avre & Co (at Exeter).	
Crediton, Devon.—Neopardy Mills and 3½ a., f.	530
Fender Plots, 3 a., f.	102
Litchenden, The Baileys, and Retter closes, 16 a., f.	348
Freehold building sites, 12 a., f.	487
Miller's Down Close, 4 a., f.	163
By Debenham, Tewson & Co. (at Downham Market).	
Wereham, Norfolk.—A freehold estate, area 113 a. 2 r. 11 p.	2,300
Smooth Hythe Enclosures, 38 a. 1 r. 3 p., f.	470
Impropriate tithe rent charges of 93*l.* 6*s.* 1*d.* per annum	1,360
By Fox & Vergette (at Sandy).	
Willington, Beds.—Willington Mill Farm, 57 a. 3 r. 1 p., f.	2,250
Six freehold arable fields, 193 a. 3 r. 5 p.	4,540
Cople, &c., Beds.—Moxhill Farm, 211 a. 0 r. 3 p., f.	8,300
September 20.—Stephenson & Alexander (at Cardiff).	
Whitchurch, Glamorgan.—Velindra, seven freehold building sites, 17 a. 2 r. 25 p. (in lots)	2,768

September 22.—By GARVEY & GOOK.

Camberwell.—144 and 146, New Church-rd., f., y.r. 72*l.* 16*s.* £800

By HARRIS & JACKSON (at Abingdon).

Radley, Berks.—Various enclosures, 45 a. 1 r. 37 p., f. 1,575
Herd Eyot Enclosure, 11 a. 0 r. 17 p., f. 220
Abingdon, Berks.—Various enclosures, 71 a. 3 r. 26 p., f. 2,055
North Court Farm, 7 a. 2 r. 12 p., f. 1,010
Freehold garden ground, 2 a. 0 r. 3 p. 230

By MORRIS, MARSHALL, & POOLE (at Ludlow).

Caynham, Salop.—Stone House Farm, 112 a. 1 r. 2 p., f. 4,700
Prospect-pl., two houses and 1 a. 1 r. 34 p., f. .. 398

By MORRIS, MARSHALL, & POOLE (at Welshpool).

Llanfair Caereinion, Montgom.—Nantycae Farm, 84 a. 0 r. 28 p., f., y.r. 64*l.* 1,200

September 23.—By DAVID BURNETT & Co.

Stoke Newington.—61, Lordship-pk., u.t. 71½ yrs., g.r. 12*l.* 12*s.*, y.r. 73*l.* 750

By GIDDY & GIDDY.

Frensham, Surrey.—Moons Hill, a freehold residence and nearly 11 a., p. 7,000

By RUTLEY, SON, & VINE.

Camden Town.—7 and 9, Pratt-st. (S), u.t. 7 yrs., g.r. 40*l.*, y.r. 115*l.* 18*s.* 240
Kentish Town.—Inkerman-rd., &c., l.g.r.'s 63*l.*, u.t. 22 yrs., g.r. 18*l.* 565

By W. H. HANSON (at Market Rasen).

Kingerby, Lincs.—Kingerby Hall Estate, 104 a. 2 r. 9 p., f. 5,000
Croft Farm, 151 a. 0 r. 13 p., f. 2,200

By J. & W. JOHNSON & Co. (at Masons' Hall Tavern).

Greenwich.—Blackwall-lane, The Star in the East p.-h., u.t. 16½ yrs., y.r. 100*l.*, with goodwill.. 5,110

September 24.—By DYER, SON & HILTON.

Blackheath.—102, St. John's Pk., f., p. 1,050
2, Vanbrugh Park-rd. East, u.t. 55 yrs., g.r. 13*l.* 5*s.*, y.r. 70*l.* 530

By DOUGLAS YOUNG & Co.

Mitcham, Surrey.—1 and 3, Mitcham Pk., u.t. 56 yrs., g.r. 16*l.*, y.r. 120*l.* 1,200

By WYATT & SON (at Chichester).

Pagham, Sussex.—Crimshams Farm, 135 a. 0 r. 32 p., f. 6,300
Two freehold pasture fields, 7 a. 3 r. 6 p. 525
Merston, Sussex.—Freehold arable field, 5 a. 3 r. 16 p. 235
Freehold cottage and 1 a. 1 r. 5 p. 255
North Bersted, Sussex.—The Elms, f., y.r. 15*l.* 15*s.* 325
Four freehold fields, 6 a. 0 r. 34 p. 730

By ROBERT HEDLEY (at Stockton-on-Tees).

Low Worsall, Yorks.—Hillilees Farm, 162 a. 3 r. 32 p., f., y.r. 150*l.* 3,375

By BALCH & BALCH (at Camden Town).

Kentish Town.—48, 50, and 52, Ferdinand-st. (S), u.t. 38 yrs., g.r. 10*l.* 10*s.*, y.r. 95*l.* 4*s.* 620
58 to 68 (even), Ferdinand-st. (S), u.t. 37 yrs., g.r. 18*l.*, y.r. 213*l.* 1,535
3 and 5, Weedington-rd., u.t. 38 yrs., g.r. 8*l.*, y.r. 66*l.* 610
1 and 2, Julia-st., u.t. 35 yrs., g.r. 11*l.*, y.r. 59*l.* 470
75, Carlton-rd., u.t. 48 yrs., g.r. 6*l.* 6*s.*, q.r. 14*l.* 280
75, Victoria-rd., u.t. 32½ yrs., g.r. 5*l.*, q.r. 36*l.* .. 340

By T. WOODS (at Hounslow).

Hounslow, Middlesex.—1 to 4, Eversley-cottages, f., y.r. 74*l.* 10*s.* 810
17, 19, and 21, Albion-rd., f., w.r. 39*l.* 420
Albion-rd., freehold building plot 105
Wellington-rd. South, Cometa House and 1 a. 1 r. 12 p., f., y.r. 75*l.* 910

By T. WOODS (at Twickenham).

Whitton, Middx.—1 and 3, Kneller-villas, f., y.r. 58*l.* 880
1 to 6, St. Joseph-ter., f., w.r. 136*l.* 10*s.* 1,540

By T. WOODS (at Twickenham).

Twickenham, Middx.—York-st., a freehold residence, y.r. 45*l.* 905
Oak-lane, freehold building site 510

By HEPPER & SONS (at Harrogate).

Harrogate, Yorks.—Pannal Ash-rd., The Rossett Hall Estate, 9 a. 3 r. 1 p., f. 12,000
Pannal, Yorks.—Lead Hall-lane, &c., enclosures of grass land, 25 a. 0 r. 22 p., f. 4,455

By LOUND & DOUET (at Horseshoe Hotel).

Thornton Heath.—Brigstock-rd., The Railway Telegraph p.-h., with shop adjoining, u.t. 60 yrs., y.r. 60*l.*, with goodwill 12,050
East Sheen, Surrey.—Upper Richmond-rd., The Hare and Hounds p.-h., and Holly Lodge, and plot of land adjoining, u.t. 24 yrs., y.r. 500*l.*, with goodwill 8,500

September 25.—By ANDREWS & HITCH.

Putney.—23, Wymond-st., u.t. 81 yrs., g.r. 3*l.* 16*s.* 8*d.*, e.r. 38*l.* 365
Hammersmith.—3, Masborough-rd., u.t. 52 yrs., g.r. 5*l.*, y.r. 45*l.* 340

By B. R. BOSTOCK.

Forest Gate.—34, Shrewsbury-rd., u.t. 92 yrs., g.r. 5*l.*, y.r. 36*l.* 280
Poplar.—35, East India-rd., u.t. 14½ yrs., g.r. 4*l.* 5*s.*, y.r. 38*l.* 200

By ELDRIDGE, SONS, & Co.

Clerkenwell.—50, 51, and 52, Great Sutton-st. (warehouses), u.t. 81 yrs., g.r. 110*l.*, y.r. 641*l.* 4,600
Finchley.—Churchfield-av., Longleat and Aberdour, f., y.r. 82*l.* 1,900

By HARDS & BRADLY.

Greenwich.—2 and 4, Frobisher-st., u.t. 53 yrs., g.r. 5*l.* 19*s.*, w.r. 46*l.* 16*s.* 385

By MAY & BIRD.

Northolt, Middlesex.—New Patent Brick Co.'s Works, area 33 a., with buildings, plant, and machinery 4,050
Kingston-on-Thames, Surrey.—Barnett-villas, &c., l.g.r.'s 70*l.*, reversion in 97 yrs. 1,850
Somerset-rd., &c., l.g.r.'s 80*l.*, reversion in 96 yrs. 2,000

By C. C. & T. MOORE.

Commercial-rd. East.—52, Watney-st. (S), f., y.r. 65*l.* 1,300
Hackney.—6 to 13, Goring-st., u.t. 51 yrs., g.r. 40*l.*, w.r. 197*l.* 12*s.* 1,010
29, Chalgrove-rd., u.t. 71 yrs., g.r. 3*l.* 10*s.*, w.r. 22*l.* 2*s.* 135
Poplar.—300, High-st. (S), area 1,900 ft., f., y.r. 35*l.* 425

By ROBINS, GORE, & MERCER.

Brixton.—147, 149, and 151, Acre-lane, u.t. 32½ yrs., g.r. 13*l.*, y.r. 112*l.* £805

By F. J. STAINES.

Mile End.—1, King-st., f., y.r. 30*l.* 410

By STIMSON & SONS.

Hackney-rd.—79 and 81, Goldsmith's-row (S), u.t. 95 yrs., g.r. 12*l.*, y.r. 235*l.* 6*s.* 2,200
Camberwell.—17 to 25 (odd), Selbourne-rd., u.t. 60½ yrs., g.r. 30*l.*, y.r. 160*l.* 1,720
Holloway.—27 and 29, Victor-rd., with workshop in rear, u.t. 71 yrs., g.r. 15*l.*, y.r. 153*l.* 850
Camberwell.—20 and 22, Jardin-st., u.t. 28 yrs., g.r. 6*l.* 8*s.*, w.r. 67*l.* 12*s.* 380
Brixton.—29, 31, 37, and 41, Dalberg-rd., u.t. 71½ yrs., g.r. 21*l.* 10*s.*, y.r. 130*l.* 1,485
7, Mostyn-rd., u.t. 61 yrs., g.r. 12*l.* 10*s.*, y.r. 70*l.* 630

By J. A. & W. THARP.

East Ham.—20 to 26 (even), Grosvenor-rd., f., w.r. 91*l.* 810
Battersea.—4 and 6, Cairns-rd., f., y.r. 36*l.* 720
Old Ford.—65 to 71 (odd), Ford-rd. (S), u.t. 37 yrs., g.r. 4*l.*, y.r. 109*l.* 8*s.* 725
Hackney.—3, Gore-rd., u.t. 52 yrs., g.r. &c. 3*l.* 5*s.*, y.r. 40*l.* 370
Islington.—1, Stanley-rd., u.t. 49 yrs., g.r. 3*l.* 15*s.*, y.r. 46*l.* 16*s.* 265
Holloway.—10, Poole's-pk., u.t. 63 yrs., g.r. 6*l.*, y.r. 30*l.* 300

By WM. WESTON.

Paddington.—301, Harrow-rd. (S), u.t. 43 yrs., g.r. 10*l.*, y.r. 65*l.* 700

By DOUGLAS YOUNG & Co. (on the estate).

Croydon.—Mitcham-rd., &c., 50 plots of freehold building land (in lots) 2,174

September 26.—By DOLMAN & PEARCE.

Haverstock Hill.—No. 26, u.t. 36 yrs., g.r. 10*l.* 10*s.*, e.r. 60*l.* 560

By MAY & PHILPOT.

Clapham Park.—South-rd., The Chestnuts, and ⅓ a., f., p. 2,000
Brixton.—109, Loughborough-pk., u.t. 20 yrs., g.r. 13*l.* 13*s.*, p. 560

By NOTT, CARTWRIGHT, & ETCHES.

Pimlico.—38, St. George's-sq., u.t. 36 yrs., g.r. 17*l.*, p. 1,050
46, Grosvenor-rd., u.t. 27½ yrs., g.r. 8*l.*, e.r. 65*l.* 580
Chelsea.—87, Walton-st. (S), f., y.r. 48*l.* 870
Croydon.—161, 163, 173, 175, 177, and 179, Bynes-rd., f., w.r. 101*l.* 8*s.* 1,120
Ramsgate, Kent.—Lyndhurst-rd., Lyndhurst, f., y.r. 40*l.* 585

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; w.r. for weekly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 13 0	per 1,000	alongside, in river
Rough Stocks and Grizzles	1 10 0	,,	,, ,,
Facing Stocks	2 12 0	,,	,, ,,
Shippers	2 5 0	,,	,, ,,
Flettons	1 8 0	,,	at railway depôt
Red Wire Cuts	1 12 0	,,	,, ,,
Best Fareham Red	3 12 0	,,	,, ,,
Best Red Pressed Ruabon Facing	5 5 0	,,	,, ,,
Best Blue Pressed Staffordshire	4 5 0	,,	,, ,,
Do., Bullnose	4 11 0	,,	,, ,,
Best Stourbridge Fire Bricks	4 8 0	,,	,, ,,
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers	13 0 0	,,	,, ,,
Headers	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats	17 0 0	,,	,, ,,
Double Stretchers	19 0 0	,,	,, ,,
Double Headers	16 0 0	,,	,, ,,
One Side and two Ends	19 0 0	,,	,, ,,
Two Sides and one End	20 0 0	,,	,, ,,
Splays, Chamfered, Squints	20 0 0	,,	,, ,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats	14 0 0	,,	,, ,,
Double Stretchers	15 0 0	per 1,000 at	railway depot.
Double Headers	14 0 0	,,	,, ,,
One Side and two Ends	15 0 0	,,	,, ,,
Two Sides and one End	15 0 0	,,	,, ,,
Splays, Chamfered, Squints	14 0 0	,,	,, ,,
Seconds Quality White and Dipped Salt Glazed	2 0 0	,,	less than best.
Thames and Pit Sand	7 0	per yard,	delivered.
Thames Ballast	6 0	,,	,,
Best Portland Cement	31 0	per ton,	delivered.
Best Ground Blue Lias Lime	22 0	,,	,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 10*s.* 6*d.* per yard, delivered.
Stourbridge Fire-clay in sacks, 27*s.* 0*d.* per ton at rly. dpt.

PRICES CURRENT (*Continued*).

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube,	deld. rly. depot
Bath ,,	1 7	,,	,,
Farleigh Down Bath	1 8	,,	,,
Beer in blocks	1 6	,,	,,
Grinshill ,,	1 10	,,	,,
Brown Portland in blocks	2 2	,,	,,
Darley Dale in blocks	2 4	,,	,,
Red Corsehill ,,	2 5	,,	,,
Closeburn Red Freestone	2 1½	,,	,,
Red Mansfield ,,	2 4	,,	,,
Hard York in blocks	2 10	,,	,,
,, ,, 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)	2 8	per ft. super. at rly. depôt.	
,, ,, 6 in. Rubbed Ditto	3 0	,,	,,
,, ,, 3 in. sawn both sides slabs (random sizes)	1 3	,,	,,
,, ,, 2 in. self-faced Ditto	0 9½	,,	,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.	
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.	
,, ,, ,, 3 in. do.	1 2½	,,	,,

SLATES.

in.	in.	£ s. d.		
20 × 10	best blue Bangor	12 5 0	per 1000 of 1200 at rly. dep.	
20 × 12	,, ,, ,,	13 5 0	,,	,,
20 × 10	best seconds ,,	11 15 0	,,	,,
20 × 12	,, ,, ,,	12 17 6	,,	,,
16 × 8	best ,,	6 17 6	,,	,,
20 × 10	best blue Portmadoc	11 7 6	,,	,,
16 × 8	best blue Portmadoc	6 5 0	,,	,,
20 × 10	best Eureka unfading green	15 0 0	,,	,,
20 × 12	,, ,,	16 10 0	,,	,,
18 × 10	,, ,,	11 10 0	,,	,,
16 × 8	,, ,,	7 10 0	,,	,,
20 × 10	permanent green	10 10 0	,,	,,
18 × 10	,, ,,	9 0 0	,,	,,
16 × 8	,, ,,	6 5 0	,,	,,

TILES.

	s. d.		
Best plain red roofing tiles	42 0	per 1,000, at	rly. depôt.
Hip and valley tiles	3 7	per doz.	,, ,,
Best Broseley tiles	50 0	per 1,000	,, ,,
Do. Ornamental tiles	52 6	,,	,, ,,
Hip and valley tiles	4 0	per doz.	,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	,, ,,
Do. ornamental Do.	60 0	,,	,, ,,
Hip tiles	4 0	per doz.	,, ,,
Valley tiles	3	,,	,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 0	per 1,000	,, ,,
Do. Ornamental Do.	54 6	,,	,, ,,
Hip tiles	4 1	per doz.	,, ,,
Valley tiles	3 8	,,	,, ,,

WOOD.

BUILDING WOOD.—YELLOW.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
flattens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,, ,,
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than batt ens.
¾ in.	1 0 0	,,
Fir timber: Best middling Dantzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0
JOINERS' WOOD.	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
,, ,, 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 10 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, ,, battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0

[*See also page 309.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issue.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Designs & Estimates for Laying-out 44 acres of Land	Borough of Arundel	50*l.* and 20*l.*	Dec. 1
*Designs for Town Hall, Library, &c.	Durban (Natal) Corporation	500*l.*, 300*l.*, and 200*l.*	Dec. 18
*Designs for Extension of Town Hall	Hull Corporation	300*l.*, 200*l.*, 100*l.*	Jan. 31
*Designs for University Buildings, Cape of Good Hope	Agnt.-Gen. for Cape of Good Hope	400*l.*, 200*l.*, 100*l.*	do.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Sewer, Asylum, Bridgend, Glam.	.....	W. E. R. Allen, County Offices, Cardiff	Oct. 7
School, Sunny-brow, Co. Durham	.....	R. Dixon, West-road House, Crook, Durham	do.
Thirty-five Houses, Ystrad Mynach, Wales	Building Club	T. W. Miller, Architect, Mountain Ash	do.
Boiler House, Gasworks	Greenock Corporation	W. Ewing, Engineer, Gasworks, Greenock	do.
Additions to Workhouse	Belfast Guardians	Young & Co., Engineers, Scottish Provident Buildings, Belfast	do.
Railway (10½ miles), Honeybourne	Great Western Railway Company	G. K. Mills, Paddington Station, W.	do.
Hospital, Park-lane, near Wigan	Abram District Council	Heaton & Co., Architects, Wigan	do.
Road Materials (4,500 tons)	Llantrisant R.D.C.	G. S. Morgan, Surveyor, School-street, Pontyclun	do.
Road Works, Heathfield-avenue	Crewe Town Council	G. E. Shore, Borough Surveyor, Earle-street, Crewe	do.
Additions to Schools, Portnockie, N.B.	.....	Sutherland & Jamieson, Architects, Elgin	Oct. 8
*Tar Macadam, Alma-place, Harrow-road	Borough of Hammersmith	Borough Surveyor, Town Hall, Hammersmith, W.	do.
Wrought Iron Fencing, Hampden Park	Eastbourne Corporation	D. J. Bowe, Surveyor, Town Hall, Eastbourne	do.
Mortuary, &c., Patricroft	Eccles (Lancs) Corporation	T. S. Picton, Civil Engineer, Town Hall, Eccles	do.
Additions to Tramway Depot	Glasgow Corporation	J. Young, 88, Renfield-street, Glasgow	do.
Sewer, Church-road, Malahide	Balrothery District Council	H. Milling, Civil Engineer, Roseneath, Malahide	do.
Surveyor's Materials	Bedlington U.D.C.	Mr. Brown, Surveyor, Bedlington	do.
Gasworks	Ardrossan (N.B.) Town Council	A. Gillespie, Engineer, 65, Bath-street, Glasgow	Oct. 9
Street Works	Halifax Corporation	L. Coates, Architect, Water-street, Halifax	do.
Additions to Schools, Park	Aberdare School Board	T. Roderick, Architect, Clifton-street, Aberdare	do.
Steel Rails (4,000 tons)	G. S. & W. Railway Co. (Ireland)	F. Ormsby, Kingsbridge Terminus, Dublin	do.
Additions to Police Station	Eastbourne Corporation	W. C. Field, Architect, Town Hall, Eastbourne	do
Sewer, Hill-road, Garlinge	Thanet R.D.C.	F. T. Elliott, Surveyor, Birchington	do.
Culvert, Amport	Andover R.D.C.	J. Wormald, Surveyor, Andover	do.
Bridge Works, Gelly Brook	Pentre (Glam.) U.D.C.	W. J. Jones, Engineer, Council Offices, Pentre, Rhondda	do.
Four Houses, Hawick-street, Carlisle	Mr. W. D. Muncaster	H. H. Hodgkinson, Architect, 9, Lowther-street, Carlisle	Oct. 10
*Erection, New Baths, Artisans' Dwellings, Stoney-lane	Corporation of London	Office of Engineer to the Corporation, Guildhall, E.C.	do.
*New Sanitary Fittings, Artisans' Dwellings, Stoney-lane	do.	do.	Oct. 11
Pipe Laying, Alexandra Parade	Glasgow Corporation	J. M. Gale, Engineer, 45, John-street, Glasgow	do.
Paving Works, College-road	Devonport Town Council	J. F. Burns, Borough Surveyor, Ker-street, Devonport	do.
Cast Iron Pipes, Pine-grove	Bootle (Lancs.) Corporation	Borough Engineer, Town Hall, Bootle	do.
Schools	Dudley School Board	Barrowcliff & Allcock, Architects, Mill-street, Loughborough	do.
Fifty Houses, Aber, Glam.	.....	G. Kenshole, Architect, Station-rord, Bargoed	do.
Additions to Chapel, Sherburn Hill, Durham	.....	J. W. Taylor, Architect, Newcastle-on-Tyne	do.
Vestry Hall, Sherwood, Llwynpia	.....	Lewis & Morgan, Architects, Pontypridd	do.
Additions to Premises, Lowmore, near Bradford	.....	Milnes & France, Architects, 90, Swan-arcade, Bradford	do.
Schools	Birmingham School Board	W. C. Jackson, Architect, Chesterfield	do.
House at Asylum, Castlebar	.....	E. K. Dixon, Civil Engineer, District Lunatic Asylum, Castlebar	do.
Kiln, Stables, &c., Seaview-road, Liscard	Wallasey U.D.C.	J. W. Crowther, Engineer, Great Float, near Birkenhead	do.
School, The Camp, St. Albans	St. Peter Rural School Board	F. W. K. Tarte, Architect, St. Albans	do.
Road Materials	Sheerness U.D.C.	T. F. Berry, Surveyor, Council Offices, Sheerness	do.
Sewer	Buxton U.D.C.	Surveyor, Council Offices, Buxton	Oct. 13
Club Buildings, Dowlais, Glam.	.....	James & Morgan, Architects, Cardiff	do.
Limestone, &c. (1,000 tons)	Ebbw Vale U.D.C.	T. Hughes, Council Offices, Ebbw Vale	do.
Cement (2,000 tons)	Manchester Corporation	Borough Surveyor, Town Hall, Manchester	do.
Subway near Victoria Bridge	Dublin Corporation	S. Harty, Civil Engineer, City Hall, Dublin	do.
Bridge Works, Eversley	Hants County Council	W. J. Taylor, Surveyor, Castle, Winchester	do.
Road Materials	Southampton Corporation	J. A. Crowther, Engineer, Municipal Offices, Southampton	do.
Mortuary	Tewkesbury Corporation	Borough Surveyor, Sun-street, Tewkesbury	do.
Drainage Works, Woodhouse Moor	Leeds Corporation	City Engineer, Town Hall, Leeds	do.
Road Works	Basford R.D.C.	G. W. Hawley, Surveyor, York Chambers, Nottingham	do.
Paving Works, Bromley-road	Beckenham U.D.C.	J. A. Angell, Surveyor, Council Offices, Beckenham	do.
*Alterations at Baths	Hackney Borough Council	Borough Engineer, Town Hall, Hackney	do.
*School on Loxford Hall Estate, &c.	Ilford School Board	Board's Architect, 7, Bank-buildings, Ilford, Essex	do.
*Road Widening and Paving Works	Beckenham U.D.C.	Council's Surveyor, Beckenham	do.
*Making-up Inniskilling, Jedburgh, &c., Roads	County Borough of West Ham	Borough Engineer, Town Hall, West Ham, E.	Oct. 14
*Road-making & Paving Wks., Back-lane, Cricklewood	Willesden District Council	Council's Engineer, Public Offices, Dyne-road, Kilburn, N.W.	do.
Church, North Featherstone, Yorks	.....	W. G. Smithson, Architect, 13, Bond-street, Leeds	do.
Sewers, High-street	Quarry Bank (Staffs) U.D.C.	W. Fiddian, Surveyor, Old Bank Offices, Stourbridge	do.
Rails, &c.	Bury (Lancs) Corporation	J. Haslam, Corporation Offices, Bury	do.
Stables, Garrison-lane	Felixstowe U.D.C.	Borough Surveyor, Town Hall, Felixstowe	do.
*Reconstruction of Skylights, &c.	Metropolitan Borough of Fulham	Borough Surveyor, Town Hall, Fulham, S.W.	Oct. 15
*Repainting Lambeth Public Baths	Lambeth Borough Council	Borough Engineer, Lambeth Town Hall, Kennington Green, S.E.	Oct. 16
*Performance of Builder's Work at Infirmary	Islington Guardians	W. Smith, Architect, 65, Chancery-lane, W.C.	do.
Police Station, Llanfairfechan	Carnarvon County Council	J. H. R. Roberts, 10, Castle-street, Carnarvon	do.
*Ambulance and Hearse Shed	Kingston Union	Union Offices, Coombe-lane, Kingston-on-Thames	Oct. 20
*Wood Floors & Fireplaces, &c., at Isolation Wards	do.	do.	do
*Porter's Room at Infirmary	do.	do.	do.
*Engineer's House and Sewage Works	Acton U.D.C.	Council's Surveyor, 242, High-street, Acton	Oct. 21
*Extension, &c., of Acton Cemetery, Willesden-lane	do.	do.	do.
*New Coast Guard Buildings, near Dover	Admiralty	Director of Works Department Admiralty, W.C.	Oct. 24
Additions to School, Greatford, near Stamford	.....	Head Master, Greatford School, near Stamford, Lincs.	Oct. 27
*Supply & Delivery of 192 Sluice Air & Reflux Valves, &c.	U.D.C. of Coalville	Council's Engineer, 6, Millstone-lane, Leicester	Nov. 4
*Supply & Delivery of Pipes & Specials at Waterworks	do.	do.	do.
*Service Reservoir to hold 500,000 gallons, &c	do.	do.	do.
*Delivery &c., 2 Comp. Inverted Tandem Pump. Engines	do.	do.	do.
*Steel Bridge at Point Ellice, Victoria, B. C.	Victoria, Brit. Columb., City Cpn.	Agent-General for B. C. 819, Salisbury House, London Wall, E.C.	do.
Farm Buildings, &c., Chickenley, Yorks	.....	F. W. Ridgway, Architect, Dewsbury	No date
Sixteen Houses, Holbeck, Leeds	.....	F. W. Rhodes, Architect, Upper Wortley, Leeds	do.
House, Prendergast, Haverford West	.....	J. Thomas, 15, Upper Laws-street, Pembroke Dock	do.
Store Premises, Bagnall	Co-operative Society, Ltd.	W. V. Betts, Architect, Old Basford	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Surveyor	Amersham R.D.C.	120*l.*, &c	Oct. 6
*Clerk of Works	Borough of Camberwell	4*l.* per week	do.
*Surveyor	East Grinstead R.D.C.	100*l.*	Oct. 13
*Sanitary Inspector	Metropolitan Borough Woolwich.	115*l.* per annum	do.
*Local Main Road Surveyor, Cirencester	Gloucester County Council	165*l.*	Oct. 18
*Local Main Road Surveyor, Thornby and Bristol	do.	180*l.*	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, p. iv. *Contracts*, pp. iv vi. viii & x. *Public Appointments*, xix.

PRICES CURRENT (*Continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Dantzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small ,, ,, ...	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	- - -
Dry Mahogany—		
Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	16 10 0	20 0 0
American Whitewood Planks—		
Per ft. cube	0 4 0	- - -
Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 13 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 0

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 15 0	8 5 0
Staffordshire Crown Bars, good merchant quality	8 5 0	8 15 0
Staffordshire "Marked Bars" ..	10 10 0	- - -
Mild Steel Bars	9 0 0	9 10 0
Hoop Iron, basis price	9 5 0	9 10 0
,, ,, galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	10 0 0	- - -
,, ,, to 24 g.	11 0 0	- - -
,, ,, to 26 g.	12 10 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality :—		
Ordinary sizes to 20 g.	16 0 0	- - -
,, ,, 22 g. and 24 g.	16 10 0	- - -
,, ,, 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets :—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	12 0 0	- - -
,, ,, 22 g. and 24 g.	13 0 0	- - -
,, ,, 26 g.	14 5 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	13 10 0	- - -
Pipe in coils	14 0 0	- - -
Soil Pipe	16 10 0	- - -
Compo Pipe	16 10 0	- - -
ZINC—Sheet—		
Vieille Montagne ..... ton	25 0 0	- - -
Silesian	24 10 0	- - -
COPPER—		
Strong Sheet ..... per lb	0 0 10	- - -
Thin ..... ,,	0 0 11	- - -
Copper nails ..... ,,	0 0 11	- - -
BRASS—		
Strong Sheet ..... ,,	0 0 9	- - -
Thin ,, ... ,,	0 0 10	- - -
TIN—English Ingots..... ,,	0 1 3½	- - -
SOLDER—Plumbers' ..... ,,	0 0 6½	- - -
Tinmen's ..... ,,	0 0 8½	- - -
Blowpipe ..... ,,	0 0 9½	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	1¾d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, fourths	2¾d. ,, ,,
26 oz. thirds	4d. ,, ,,
,, fourths	3¼d. ,, ,,
32 oz. thirds	5d. ,, ,,
,, fourths	4¼d. ,, ,,
Fluted sheet, 15 oz.	3d. ,, ,,
,, 21 ,, ...	4d. ,, ,,
½ Hartley's Rolled Plate	1¾d. ,, ,,
⅜ ,, ,, ,, ...	2d. ,, ,,
½ ,, ,, ,, ...	2¾d. ,, ,,

PRICES CURRENT (*Continued*).

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels ..	per gallon	0 2 6
,, ,, ,, in drums	,,	0 2 9
Boiled ,, ,, in pipes or barrels ..	,,	0 2 8
,, ,, ,, in drums	,,	0 2 11
Turpentine, in barrels	,,	0 2 11
,, in drums	,,	0 3 1
Genuine Ground English White Lead	per ton	21 0 0
Red Lead, Dry	,,	20 0 0
Best Linseed Oil Putty	per cwt.	0 1 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 6
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Superfine Pale Copal Body	1 4 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 8 0
Brunswick Black	0 5 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 16 0

TO CORRESPONDENTS.

J. S. (Amounts should have been stated.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l*., unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BEXLEY.—For the erection of four cottages on the Foresters' Asylum Estate, May Place-road, Bexley Heath, Kent. Mr. W. F. Potter, architect :—

J. Shelley ..	£1,950 0 0†	W. F. Small	£1,275 0 0
Robson & Moon	1,935 6 0	Arnold & Co.	1,269 0 0
W. F. Blay..	1,816 0 0	G. A. Bown	1,220 0 0
J. Lonsdale	1,714 0 0	J. Dawson ..	1,200 0 0
W. Coates ..	1,642 0 0	Enness Bros.	1,178 0 0
Coulsell Bros.	1,600 0 0	Poulton & Sons, Thornton Heath*..	1,120 0 0
Crabb & Son	1,540 0 0	W. Mayhew..	1,095 0 0†
H. J. Atkin..	1,457 12 6		

BROMLEY (Kent).—For alterations and new marble and other fittings to fishmonger's shop, Widmore-road, for Mr. S. C. Conell. Mr. W. James Pamphilon, architect, St. Kilda, Bromley, Kent :—

Hill & Son	£769	Crossley & Son	£650
Seaty	738	Payne	648
Duchart	660	Arnand & Son*	563

[All of Bromley.]

COWLEY (Middlesex).—For alterations and repairs to the Rectory, for the Rev. W. R. C. Hamilton. Mr. G. St. Pierre Harris, architect, 8, Ironmonger-lane, E.C. :—

C. F. Kearley.....	£663	Fassindge & Son*....	£639
H. Borton & Sons....	652		

DOVER.—For the erection of Turkish baths, for the Town Council. Mr. H. E. Stilgoe, C.E., Maison Dieu House, Biggin-street, Dover. Quantities by the Borough Engineer :—

H. Richardson	£3,100 0 0	R. W. Paramor	£2,494 0 0
G. Denneson	2,938 0 0	Gann & Co. ..	2,451 18 7
T. T. Denne..	2,850 0 0	E. Stokes	2,448 0 0
Austen & Lewis	2,778 0 0	R. & G. Brisley, Dover*	2,399 0 0
G. Munro	2,597 18 4		
G. Keeler	2,586 0 3		

FARNBOROUGH (Kent).—For erection of four shops and houses for Mr. T. Hubbard. Mr. Money Marsland, architect, 68, Great Tower-street, E.C. :—

W. Owen* £1,880

FLEET (Hants).—For the erection of a new shop and residence. Mr. Hy. A. Whitburn, architect, 22, Surrey-street, W.C., and Woking :—

Poole & Sons* £699

HALLIFORD.—For the erection of an annex to bungalow for Mr. J. Parker-Ayers. Mr. H. Fuller Clark, architect, 30, John-street, Bedford-row, W.C. :—

Simpson & Co. £112

LONDON.—For repairs and sanitary work to be done at the Licensed Victuallers' Asylum, Asylum-road, Old Kent-road, S.E. Mr. W. F. Potter, architect :—

	Repairs.	Sanitary Work.
King & Son	£435 0	£80
H. Cooke	295 10	105
J. J. Bridger	—	75
F. Dawes, Peckham Rye* .	210 0	52

LONDON.—For pulling down and re-erecting 64-67, Tottenham Court-road, W., being the second portion of new premises for Messrs. E. Catesby & Sons. Mr. Hy. A. Whitburn, architect, 22, Surrey-street, W.C., and Woking. Quantities by Mr. J. T. Carew, 22, Surrey-street :—

J. Marsland	£12,952	Richards & Co....	£11,839
Burman & Sons ..	12,145	Smith & Sons	11,550
Mattock Bros.	11,997	Patman & Fotheringham*	11,093
H. M. Dove	11,920		
J. Carmichael	11,848		

LONDON.—For dynamo and engine room floor, f c.r Metropolitan Borough of Stepney. Mr. M. W. Jameson, Borough Engineer :—

W. Johnson.....	£204	Johnson Bros., 168, Whitechapel-road*..	£112
Calnan & Son	169		
W. G. Brown	167		

[Borough Engineer's estimate, £105.]

LONDON.—For stores, cart and van sheds, office, lodge, and public urinal, Wentworth-street depot, for the Metropolitan Borough of Stepney. Mr. M. W. Jameson, Borough Engineer :—

F. & F. J. Wood ..	£7,145	Watts, Johnson, & Co.	£5,977
Balaam Bros.	7,000	Johnson & Son	5,916
Martin Wells & Co.	6,700	Chessum & Sons....	5,788
Patman & Fotheringham	6,591	J. O. Richardson ..	5,773
J. T. Robey.....	6,376	A. E. Symes.....	5,767
Calnan & Sons	6,405	H. Lovatt.....	5,700
R. & E. Evans	6,336	S. E. Moss	5,663
Dove Bros.	6,335	Sabey & Son	5,571
Smith & Sons, Ltd..	6,237	Thomas & Edge, Anglesea-avenue, Woolwich, S.E.* .	5,463
Coulsell Bros.	6,181		
Dearing & Son	5,997		
L. T. Lamplough ..	5,989		

[Borough Engineer's estimate, £6,722.]

MIDDLETON.—For alterations, additions, &c., a Middleton Hall, Norfolk. Mr. H. J. Green, architect, Castle Meadow, Norwich :—

J. Kinninmont & Sons, London* £2,390

MITCHAM.—For the erection of a school, with care taker's house, at Lonesome, for the Mitcham School Board Mr. H. Carter Pegg, architect, Thornton Heath :—

E. J. Burnand	£5,040	Smith & Sons	£4,760
General Builders Co., Ltd.	4,997	Burges & Sons	4,700
R. A. Lowe	4,995	Leney & Son, 36, Hawthorne-grove, Penge*	4,580
Jenkin & Co.	4,803		

OXTED (Surrey).—For drainage to ten cottages, Station-road. Mr. Money Marsland, architect, 68, Great Tower-street, E.C. :—

G. Morgan ..... £132 | Sales & Son* £123

PARKSTONE (Dorset).—For the erection of new offices, Upper Parkstone, for the Wilts and Dorset Banking Co., Ltd. Mr. Walter Andrew, architect, Parkstone :—

J. Wright	£3,568 5 6	A. & F. Wilson	£2,900 0 0
W. J. Cross ..	3,116 17 6	Baker & Pearcy, Parkstone*..	2,806 16 4
Miller & Sons	3,090 0 0		
J. H. Wilson..	2,940 0 0		

ST. MARY CRAY (Kent).—For the erection of additions to two shops. Mr. G. St. Pierre Harris, architect, 8, Ironmonger-lane, E.C. :—

T. Knight	£1,228 0 0	J. Smith	£1,129 0 0
Somerford & Son	1,132 0 0	Stebbings & Pannett	974 10 0

SEACROFT (near Leeds).—For foundations of the Willingbeck Hospital for Smallpox, for the city of Leeds. Mr. Edwin T. Hall, architect, 34, Bedford-square, London, W.C. :—

M. Hall	£9,064 7 6†	Turner, Heason, & Mitchell	£5,812 0 0
J. Ellis	7,612 10 0	J. Bentley....	5,648 0 0
Irwin & Co., Ltd.	6,693 0 0	Graham & Sons	5,460 0 0
T. E. Sugden	6,300 0 0	Wilson & Co.	5,146 1 10
B. Firth.....	6,221 3 5	Arnold & Son, Doncaster*	5,005 0 0†
Musgatroyd & Son	6,200 0 0		

SOUTH WOOTTON.—For alterations and additions to house at South Wootton, Norfolk. Mr. H. J. Green, architect, 31, Castle Meadow, Norwich :—

J. Cracknell	£298 0
R. Dye.....	285 0
Tash, Langley, & Co.	279 11
Read & Wildbur, King's Lynn†	274 0

† Recommended for acceptance.

[See also next page.

STRETFORD.—For the erection of generating station, for Stretford Urban District Council. Mr. Ernest Woodhouse, architect, 38, Mosley-street, Manchester :—

W. D. Scott	£12,000	Burgess & Galt	£8,972
William Healey	11,050	B. Morton	8,037
J. Byrom	10,669	Normanton & Sons	8,839
Vickers, Ltd.	10,240	T. & W. Meadows	8,776
Vickson & Son	10,100	Samuel Warburton	8,685
Cleworth Robinson	10,000	W. Thorpe, 380, Chester-rd.,	
J. Ramsbottom	9,900	Old Trafford,	
Clement Wallworth	9,800	Manchester*	8,387
John Bland	9,489		

SUTTON.—For the erection of new laundry at the Banstead-road Schools, Sutton, for the managers of the Metropolitan Asylums Board. Messrs. Newman & Newman, architects, 31, Tooley-street, London Bridge, S.E. Quantities by Messrs. Barber & Sons, 22, Buckingham-street, Adelphi, W.C. :—

J. R. Bex	£12,922	Bowyer & Co.	£11,744
Potter Bros.	12,138	Goddard & Sons	11,700
W. Reason	11,945	Smith & Sons	11,518
Gardener & Hazel	11,916	R. L. Tonge	11,157
J. Horrocks	11,876	S. Page	11,100
T. Cole	11,838	J. B. Potter, Sutton*	11,059
Cropley Bros.	11,829		

TARBOLTON (N.B.).—For the erection of school buildings, Annbank Station, for the School Board. Messrs. J. & H. V. Eaglesham, architects, Wellington-chambers, Ayr :—

Building.—David Kirkland, Ayr*	£1,770	1	3
Joinery.—David Kirkland, Ayr*	1,080	17	9
Slating.—McIlwrath, Cowan, & Co., Ayr*	216	12	0
Plumbing.—McIlwrath, Cowan, & Co., Ayr*	251	14	9
Plastering.—D. & T. Bone, Ayr*	217	0	0
Painting.—Wm. Fraser, Prestwick, near Ayr*	63	1	9

WESTERHAM HILL (Kent).—For alterations and additions to "Fox and Hounds," for Messrs. Fox & Sons. Mr. G. St. Pierre Harris, architect, 8, Ironmonger-lane, E.C. :—

E. Martin & Sons, Westerham* £1,472 13

WEST HAM.—For the erection of the Whalebone-lane Higher Elementary Schools, Stratford, E., for the West Ham School Board. Mr. William Jacques, architect, 2, Fen-court, E.C. Quantities by Messrs. R. L. Curtis & Sons :—

W. Gladding	£35,347
Battley, Sons & Holness	30,640
Stimpson & Co.	30,330
G. Sharpe	30,103
Holliday & Greenwood	29,893
Gregar & Son	29,829
W. J. Maddison	29,187
A. Reed	29,096
A. E. Symes, Stratford†	28,400

† Accepted subject to the approval of the Board of Education.

WOKING (Surrey).—For the erection of a new residence, for Mr. C. J. Butler. Mr. Henry A. Whitburn, architect, 22, Surrey-street, W.C., and Woking :—

Martin Wells	£2,350	Drowley	£2,118
A. A. Gale	2,284	J. Whitburn	2,090
G. Kemp	2,198	Harris & Son, Woking*	2,049
Ingram	2,197		

B. NOWELL & CO.
STONE MERCHANTS & CONTRACTORS.
Chief Office.—*Warwick Road, KENSINGTON.*
Norway, Guernsey, and Leicestershire Granite, Kerb, Pitching, and Yorkshire Stone.
ESTIMATES GIVEN FOR EVERY DESCRIPTION OF ROAD MAKING.

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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office,* Catherine-street, Covent Garden, W.C. *free of charge.* Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

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W. H. Lascelles & Co.,
121, BUNHILL ROW, LONDON, E.C.
Telephone No. 1365, London Wall.
HIGH-CLASS JOINERY,
LASCELLES' CONCRETE
Architects' Designs are carried out with the greatest care.
CONSERVATORIES,
GREENHOUSES,
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